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ADDRESSES AND ORIGINAL ARTICLES

THE CONCEPTION OF "NERVOUS DISORDER."*

BY MILLAIS CULPIN, M.D. LOND., F.R.C.S. ENG.,

LECTURER IN PSYCHONEUROSES, LONDON HOSPITAL MEDICAL COLLEGE, AND IN MEDICO-INDUSTRIAL PSYCHOLOGY, LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.

THE differences of attitude within the ranks of those dealing with medical psychology are small in comparison with the differences between their general outlook and the outlook of those of our profession who do not deal with that subject. Most of us regard that difference of outlook as marking the clash of new ideas and old prejudices, and anyone familiar with the resistance that met the pioneers of psycho-analysis must agree that prejudices of a special quality were aroused by the nature of their discoveries.

Freud disturbed the peace of the world, but, having admitted that, I propose to show that the clash did not begin in 1895. The paper of my colleague Miss May Smith (on the Nervous Temperament) [1] led me to see how the pendulum has swung between the two schools represented at one time by vitalists and mechanists, at another by animists and iatro-physicists, nominalists and realists, and now by psychologists and neurologists, for, despite efforts at reconciliation, we must own that the outlooks of the last-named pair upon a case of hysteria are fundamentally different. Freud, who was primarily a neurologist, has admitted that his neurological knowledge was useless in his work upon those clinical problems that he has done so much to solve. What is the history of these attitudes and how have these problems come to be expressed in neurological or pseudoneurological language?

Such language cannot be avoided, and I find myself speaking of "nervous" patients, whilst agreeing with Dr. Johnson, who, in 1783, wrote of "a tender, irritable, and, as it is not very properly called, a nervous constitution." The language, too, possesses infinite possibilities. In an official report in 1911 on Telegraphists' Cramp, there occur "nervous instability," "neurasthenic temperament," "nervous disposition," "permanent nervous weakness," "nervousness of temperament," and "nervous type." Other variants are neuropath, psychoneurosis, and neuropsychosis, neurosis and neurotic, nervous debility, nervous exhaustion, nervous breakdown, and less well-known gems such as neuro-mimesis and cerebro-cardiac neuropathy. The growing popularity of neuritis—a comparatively rare disease in hospital out-patient practice—makes me fear that, like a good apple among rotten ones, "neuritis" will find itself among the throw-outs.

Here, then, is a terminology of inexactitudes that calls for inquiry as to its origin, and since it must express some general conception the history of the terminology and of the conception may be taken together. Here I shall make use of material from Miss Smith's paper.

Early Conceptions of Disease.

Starting with Hippocrates, we find the conception of the "physis," a term difficult to translate but appearing to mean the organism as a whole or perhaps something behind the organism, from which the word "physiologist" is derived. To quote from Brock:

> "The Greek masters of medicine observed, as do our experienced clinicians and practitioners still, and as our laboratory specialists increasingly fail to do, that the living organism under natural conditions acts primarily as a whole, and that the actions of its parts are naturally subordinated to this supreme function."

And again:

> "The physis is not secondary to the corpuscles, but a long way prior to and older than they . . . it is the physis which puts together the bodies of plants and animals by virtue of the faculties which it possesses . . . . And when they are born it provides for them by the use of, again, other faculties—one of affection and provision for offspring, one of companionship and friendship for kin."[2]

The physis and the Groddeckian "Es" are not far different, and the paradox emerges that few physiologists would grant the existence of that physis of which they are nominally the exponents.

Galen, who belonged to no school but leaned towards vitalism, gave currency to the humoral pathology of temperaments now enshrined in the words sanguine, choleric, phlegmatic, and melancholic, with the warning that "there is the creative power of nature that shapes parts according to the disposition of the mind."

Behind the humours were forces or influences, the elements as known to the ancients—earth, air, fire, and water. Here is an attempt to express disease and character traits in terms of known forces; we might smile at its simplicity, but there is a craving in us to continue this attempt, a craving that almost demands a physis of its own and so urgent that we again and again invent hypotheses whose only use is to satisfy it. Here is no question of pragmatic value; the function of the hypotheses is not to guide, or to subsume knowledge under a formula, but to satisfy the craving for an answer to the question "What makes the wheels go round?"

Against Hippocrates and the physis may be set up Asclepiades and the atoms. He was described by Brock as a man of vigorous intellect and will, who made up his mind what he wanted, and proceeded to get it, and such a man could have no use for the physis. He took Rome by storm with the theory that all vital functions resulted from the movement of atoms—the latest theory, just introduced to Rome by Lucretius. Brock compares him with one Abrams, of San Francisco, who utilised in a similar way the theory of electrons.

In Hippocrates and Asclepiades are exemplified two opposing attitudes that continue to this day. The medical psychologist, whose training has included a certain minimum of physiology and pathology, is content to stop short at a point where he believes these disciplines can carry him no further, and then attempts to understand his problems by a study of the organism as a whole. What has decided each of us in that attitude would be a delightful subject for investigation. May I recount the discovery of my own attitude? As a surgeon during the war, I was often invited to operate on a patient—with a deformed foot, let us suppose—of whom, after examination according to my training, I would say "No, I won't operate on him; he's doing that himself." It seemed quite simple, and if I had been called an animist my ignorance would have precluded emotional response; if a psychologist—well, we know what the English army did in Flanders. I cannot say why I

* Presidential address to the Medical Section of the British Psychological Society delivered on Dec. 17th, 1930.

did not think out what nerve centres were concerned in the mechanical production of the deformity; I did not trouble then and I do not trouble now. Yet we know that many of our colleagues would study such a case not as a reaction of the man as a whole, but as a "functional nervous disorder," and seek to understand it as a derangement of physiological mechanisms. The difference is fundamental and not to be smoothed away by hopes that some day we shall be able to explain one world in terms of another, to account for hysterical behaviour, disordered hopes and fears, political opinions and gastronomic likes and dislikes, by reference to the central nervous system.

Temperament.

Preserved chiefly by Arabian medicine, Galen's conception of temperaments played a great part at the revival of learning. Each advance in natural science was seized upon as the key to the temperaments and one primum mobile after another served to satisfy the eternal craving. Sometimes the new force was hailed as superseding animism or vitalism, sometimes it was an expression of it; sometimes the neophyte in history is entirely at sea in understanding what the disputants were driving at. Van Helmont (born 1577) made play with the archæus and its relations with fermentation. Sylvius followed with vital spirits that were prepared in the brain by a process of distillation, and used chemistry as the key to all problems. He ascribed most illnesses to acids and his ideas may survive in popular beliefs of to-day. Sprengel, the medical historian, writes: "Thus the most noble of all the arts became the prey of the imagination of the chemists." [3] Miss Smith showed how Stahl, after Harvey's discovery of the circulation of the blood, used the facts to give a mechanistic turn to his animism. "The mind adopts and maintains as its fundamental disposition that particular disposition which the movement of the humours through channels of a definite type has given to the pulse or circulation." The sanguine temperament was due to fluid blood flowing easily through channels broad and wide, resulting in harmoniously operating processes throughout the body.

Stahl has satisfied his craving, and lest we may think his modes of thought differ from those of our age we can find a parallel in 1908.

> "We know what a delicate structure the brain is, and if there be an anæmia, or a flushing (such as we can very often see for ourselves in the vessels of the skin) of the whole or part of the brain—for instance, one hemisphere or one or other of the ideomotor areas—what is more likely than that paresis of the corresponding limbs should result . . . This, in brief, is my view of the pathology of many hysterical disorders." [4]

Stahl was a shrewd observer, and so was this writer; each used for the same end the physiological knowledge of his day, and two centuries have made no difference in their modes of thought, nor in the results of their thinking.

Conveyance of Irritability by Nerves.

In opposition to Stahl's theories came the mechano-dynamic views of Hoffman, who translated the anima into an ethereal fluid, secreted principally by the brain, which draws it from the blood and distributes it by means of the nerves. This paved the way for the application of the physiology of Haller, who discovered the function of nerve in conveying irritability to muscle. According to Sprengel, the medical historian, he built up in terms of irritability his own theory of temperaments; thus "a feeble irritability, joined to an energetic fibre, constitutes the sanguine temperament." [3] My view is that Haller's theory of temperaments, to which he devoted 26 lines in a total of 566 pages, was a by-product to which he attached little value. He believed in the existence of a nervous fluid, a substance that passed along the actual nerves, and a *nervous theory* now sprang up by which "all the phenomena of life, especially the movements of the solids and the mixture of the humours are the results of the influence of the nervous force . . . all the diseases that appear to have as a cause an alteration of the humours depend upon the affection of the nervous system." [3] The nervous fluid, originally supposed to pass along the tubular nerves, has now become a nervous force difficult to distinguish from the old vital spirits. Schaeffer (1782), says Sprengel, "rendered great services to the nervous theory." "He demonstrated that even in the maladies called local the nervous force exercises a powerful influence; that, for example, cancerous ulcers and chronic cutaneous eruptions depend evidently upon feebleness."

What a development from Haller's discovery that nerve conveys irritability to muscle! Sprengel, writing in 1800, ends his chapter on Haller with more than a note of triumph.

> "The vivid light that the theory of excitation has for more than 20 years thrown upon dogmatic medicine has at last shown that all efforts made before then to explain the nature of organised beings were lacking in unity and went beyond the limits of our understanding. . . . Whilst all useless research upon the nature of the vital force has been avoided, there has been demonstrated in the most satisfying way the difference that exists between chemical or mechanical effects and the organic operations of the body. . . . It was reserved for the period in which we live to put an end to our uncertainties, to refute all the theories of the atomists, and to establish pure dynamics upon foundations for ever unshakable." [3]

He goes on to tilt at the still opposing theory of chemical materialism, and then into a discussion of materialism and the immortality of the soul, in which he quotes Voltaire, David Hume, Kant, and Priestley. Some serious matter beyond my understanding is involved in the advocacy of nervous force versus vital force. I cannot identify the nigger in the woodpile.

Sprengel gives, as part of the development of the theory of irritability, the views of Cullen, an Edinburgh physician who edited the translation of Haller's "First Lines," and he leaves us in no doubt as to the influence of Haller. The late Sir Clifford Allbutt was as emphatic about the neglect of Haller, specifically blaming Cullen and suggesting that all he knew about Haller was at secondhand. This contradiction can be understood. Cullen and his contemporaries used Haller's discovery as van Helmont, Sylvius, Stahl, and Hoffman used the discoveries of their day—to satisfy the eternal craving by yet another hypothesis; to Sprengel this was a magnificent feat, to Allbutt it bore no relation to science. He writes:

> "Into Cullen's other works some of the Hallerian teaching seems to have found its way, perchance by the eclectic Gaubius, but of the method and spirit of the great man we find little" . . . "for the hearer of Cullen's physiological lectures Haller might never have existed" . . . "this hollowness makes the medical writers of the latter half of the last [18th] century and the beginning of this seem farther from us than Galen himself, in whom, as F. J. Payne rightly insisted, the true spirit of experimental science was awake."

Whilst admitting all this is justified, we may differ from Clifford Allbutt and maintain that Haller was not neglected, but shamefully misused.[5]

Sprengelian enthusiasm crops up in a survey of medicine up to date by Seelig in 1925:—

> "These studies substituted for the old Hippocratic principle of the 'pneuma,' for the 'Archæus' of Paracelsus, for the 'vital spirits' of Sylvius, for the 'anima' of Stahl,

for all these vague meaningless things these studies of Haller substituted the simple principle of irritability, a force now recognised and experimentally demonstrable in all living tissue. . . . . We may well picture to ourselves the significance of the enunciation and proof of such a far-reaching fact. How many of us might covet the glory of accomplishing as much as this, even after a long life of labour." [6]

The Weltanschauung of 1800 is remote from us, but 1925 is near enough for us to inspect the wood-pile. Seelig's survey contains no reference to medical psychology—not even a thrust at Freud. The nigger emerges as the belief that nerve irritability made psychology unnecessary.

Now for Haller himself. His account of the physiology of nerve and muscle is as modest as it is logical, and he seems to attach to it no greater importance than to his other work. In the chapter on Conception, we read:—

"Thus much concerning the materials; but we are at a loss concerning the formation. . . . We readily reject such causes as a fortuitous concourse of atoms, the blind attractions between the particles of the nutritious juices, and the strength of ferments, inconscious of the reasons why they operate; the soul is certainly an architect unequal to the task of producing such a beautiful fabric; as for internal models, of which I never could conceive one clear idea in my mind, we shall refer them to those hypotheses which the desire of explaining those things, of which we are unwillingly ignorant, has given rise to." [7]

He recognises the craving and shuns it.

Neuroses.

Let us take up the thread again with Cullen. He ascribed to the brain a motive force upon which the strength of the body depends and from which, by its relation to the density and elasticity of the nervous fluid, results the temperament.[3] About 1780 he introduced a word whose subsequent history needs attention, and wrote: "I propose to comprehend under the title of neuroses all those preternatural affections of sense or motion which are without pyrexia, as a part of the primary disease." [8] Among his neuroses were (I quote from Clifford Allbutt) apoplexy and palsy, syncope, dyspepsia, hypochondriasis, tetanus, epilepsy, chorea, palpitation, dyspnœa, asthma, whooping-cough, pyrosis, colic, cholera, diarrhœa, diabetes, hysteria, hydrophobia. The Oxford English Dictionary gives later uses in the first half of the nineteenth century: lead colic was a neurosis, and (1843) "the diseases of function embrace the neuroses, hæmorrhages and dropsies."

In 1874 Maudsley broke new ground in speaking of "Insanity, epilepsy and some allied neuroses;" he equated *neurosis spasmodica* with the insane temperament, defining it as "a defective or unstable condition of nerve element, which is characterised by the disposition to sudden, singular and impulsive caprices of thought, feeling, and conduct." [9] Is this a physiological observation, has it enough practical utility to give it value, or is it another result of the eternal craving? Let us satisfy our own craving by seeking a reason why Maudsley made this excursion into the jungle of pseudo-neurology.

In the early seventies Huxley and Romanes, in setting the affairs of the world upon a mechanistic basis, seem to have wandered into metaphysics. Here is a brain; here are mental processes; what is the connexion? We are all metaphysicians enough to be compelled to believe that every mental activity is related to a neural activity, and Huxley gave to the former the name of psychosis, to the latter the name of neurosis. I shrink from this subject, for when I read that neurosis in the psychological sense signifies "a change in the nerve-cells of the brain prior to and resulting in psychic activity," [8] the attempt to think what that means makes me know what it is to feel like one of Janet's obsessional ruminators; but the Oxford Dictionary supports this definition with quotations from Huxley.

We must remember that this was a time of conflict, a time when Huxley carried on a public controversy with Gladstone about the authenticity of the story of the Gadarene swine. In such a conflict the ranks must close up, and perhaps the dominance of neurosis over psychosis had a significance now lost to us, for the field of theological controversy has out-of-the-way corners. My remembrance of the echoes of that conflict suggests that to admit the psyche could dominate the neuron might have been feared as tending to a final surrender and the acceptance of the story of the swine. We can only suspect the nigger in the wood-pile.

We may conclude that Maudsley was influenced by the philosophical tendency of the period when he gave us this new use of an old word. But his new use had a short reign. Neurosis now means anything the speaker likes, except insanity. When and how this change took place I do not know, but the processes that were once, as it were, the two sides of a shield are now widely separated in their clinical meanings. A man who is irrationally afraid to walk across a field, and acts accordingly, suffers from a neurosis, as does a man with mucous colitis, or an irritable heart; a man who irrationally believes that people are persecuting him, and acts accordingly, suffers from a psychosis—not a neurosis. It is all so very confusing. Huxley was once an examiner, and whoever is tempted to use the word clinically should imagine himself a candidate asked by that vigorous controversialist "What is a neurosis; how would you diagnose and treat it?"

This episode ends with that final triumph of the nineteenth century, the word "neurotic"—an embodiment of pseudo-physiology, unsound metaphysics, and moral condemnation. It often indicates that, since the patient's symptoms do not accord with our hypotheses, he is not really ill but only thinks he is.

The Nervous Temperament.

A "nervous temperament" needs mention. Galen taught nothing about it, but in 1805 Cabanis remedied the ignorance of two millennia by discovering that there are people with whom the nervous system predominates over the muscular. There must be differences of temperament according to the dominance of one or the other, so he devised a nervous and a muscular. The muscular disappeared, but the nervous is still popular enough to justify a brochure by Dr. Smith and myself in which we describe our efforts to identify it.[10]

It must not be thought that all this was unopposed. Sprengel's contempt for the chemists showed the existence of opposition, and the following from the preface to a book by Robert Whytt illustrates a defensive attitude not unfamiliar:—

"The disorders which are the subject of the following observations, have been treated by authors under the names of flatulent, spasmodic, hypochondriac, or hysteric. Of late, they have also got the name nervous which appellation having been commonly given to many symptoms seemingly different, and very obscure in nature, has often made it to be said that physicians have bestowed the character of nervous on all those disorders whose nature and causes they were ignorant of. [We can almost hear the voice of Dr. Johnson].

"If it should be said that to account for diseases from the sensibility or sympathy of the nerves, while we know not wherein these powers consist, is no better than referring them to a *facultas incognita*, or to the hypothetical motions or counter motions of the animal spirits, I shall only answer

that although we cannot explain why grief or joy should, by means of the nerves, excite a greater motion than usual in the vessels of the lacrymal glands, yet it is leading us to the truth and advancing one step farther in our knowledge, to show that the increased secretion of tears, occasioned by those passions of the mind, proceeds from this cause, and not from any compression of the lacrymal glands or their ducts, by the neighbouring muscles, as has been commonly supposed. And to ascend from small things to great, although Sir Isaac Newton did not pretend to explain the cause of gravity, yet he made no small improvement in physical astronomy when from this principle alone he accounted for the various motions of the planets, and banished the imaginary vortices of Descartes, which had been contrived, but unsuccessfully, to explain the phenomena of the solar system." [11]

Functional Nervous Disorder.

In the early part of the nineteenth century the substitution of nervous force for earlier prime movers was unchallenged. Ideas, however, must have become complicated, for in 1868 Beard's popularisation of neurasthenia was hailed as bringing order out of chaos. Beard's view (I quote from Savill) was that the primary factor is over-civilisation, which disturbs the balance between nerve waste and repair, and results in a weakened and unstable nerve force. This, however, is almost the last appearance of the old favourite, and it gave place to a weakened or exhausted nervous system. This survives alongside the newer conception of "functional nervous disorder," which draws upon our increased knowledge of anatomical detail to make a last defence against anything savouring of the heresy of animism.

Yet a sound physiology has existed side by side with these perseverations, and in 1811 Bell wrote an account of the central nervous system that rested entirely upon observation and rigid deduction, with no reference to nerve force or other speculative salve for our ignorance. He wrote:—

> "The operations of the senses in rousing the faculties of the mind, and the exercise of the mind over the moving parts of the body, is through the brain and nerves." [12]

Such is the attitude of modern physiology, which is content to regard mind as a useful abstraction and leave it at that. The old craving is, however, still at work, and in a film shown in this country, and recording the experiments of Pavlov, the last picture gave us the news that "Man's behaviour is but a series of conditioned reflexes." Dr. Smith has drawn attention to the modern Count Fosco who wrote, concerning endocrines:—

> "These glandular predominances are determining factors in the personality, creating genius and dullard, weakling and giant, Cavalier and Puritan. All human traits can be analysed in terms of these because they are expressed by them." [13]

I absolve my physiological friends from any share in these attempts to pour the products of a recent harvest into a very ancient bottle.

Minor Psychoses.

The theory of "nervous disorder" is a parasitic growth upon scientific medicine; hopes that it may at some future time find more legitimate connexion are a hindrance when we treat them as present realities and, like Sabinus and his sect, invent improbable explanations of things that do not happen.[14] The theory has become limited to a narrower sphere since the days of Cullen, but within that sphere we still give validity to speculative pathology. The acrimonious controversy in which Herbert Page, a sound animistic surgeon, proved, in opposition to Erichsen, that "railway spine" did not depend upon obscure lesions of the cord but was a reaction of the man as a whole, took place in the 'eighties. When the Great War produced a record crop of minor psychoses, there sprang up the theory of shell-shock, and men with hysterical conditions received wound stripes for physical injury. We read about tiny hæmorrhages into the brain, of synapses separated by the force of high explosives, of the effect of gases upon the blood and the nerves. Our friends the enemy produced the same theories. Then, as Ferenczi wrote, "silence fell upon the mechanistic camp." In order that the war might continue, the phrase shell-shock was prohibited, and theories about it were buried with as little fuss as possible. After the war Herbert Page, then an old man, wrote to me a pathetic letter, in which he said that all the symptoms of shell-shock would be found in his book on "Railway Injuries," but that the lesson he had tried to teach had been forgotten. Railway spine survives as traumatic neurasthenia, and we read medical evidence that nerves are shattered as the result of an accident that produced little or no demonstrable trauma.

Glenard's speculations on enteroptosis as the cause of neurasthenia led to pexies innumerable. At one stage it was laid down that no neurasthenic patient should be told he had a movable kidney; he was supplied instead with X ray films with arrows on them showing where his colon and stomach had slipped to Only recently has it been announced that virginal visceroptosis should not be operated upon. The occupational neuroses—nystagmus, cramps, and such like—are supposed to produce nervous symptoms; which is as if the spots produced the typhoid. It is amusing to read of the epidemic of night-blindness in the Continental armies, to which there are some 40 references in the literature, which had cardiac irritability among its many causes. It is not amusing to find night-blindness competing with cardiac instability as a cause of disablement in miners' nystagmus, which costs us over £650,000 per annum in compensation.

My statistical friends do sums about the incidence of sickness under the Insurance Act. You might not think that has any relation to nerve irritability, but here is the sickness experience of printers: "In long-period illness the diseases grouped under the nervous system are the most consistently important. They produce throughout insured life between 30 and 40 per cent. of all the days of disablement and approximately a quarter of all the claims." Turning to the specification of "Diseases of the Nervous System" we find: thrombosis, embolism, insanity, neurasthenia, hysteria, neuritis, epilepsy, neuralgia, nervous debility, vertigo, myelitis, insomnia, chorea, faints, paralyses, tabes, cerebral hæmorrhage.[15]

Having brought the story up to the present day, I hope I have carried out a part of the task I began with—to trace the history that lies behind some modern differences of attitude. I have, however, omitted half the task as being beyond my powers. Some may regard as entirely new the modern observations and theories upon which we, as medical psychologists, are in general agreement; some may see a continuity of descent through earlier lines of thought, and the continuity of the conflict of attitudes makes me incline to the latter view. But the inquirer will meet at every period an emotional emphasis upon differences of theory, for which the contending parties offer no explanation and that may depend upon the spirit of the period as well as upon the fundamental tendency of mankind to externalise his inner conflicts and difficulties. It is this tendency, you will agree, that makes the public cling so strenuously to the belief in mechanical forces as responsible for psychological troubles.

(*References at foot of next page.*)

TREATMENT OF LOBAR PNEUMONIA BY FELTON'S SERUM.

A PRELIMINARY REPORT BASED ON FIFTY-EIGHT CASES.*

BY

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WHEN it was recognised that more than 90 per cent. of the cases of pneumonia were due to infection by the pneumococcus it was hoped that a specific antiserum might help in the treatment of the disease, but until recently the available sera have proved of little value.

Extensive investigations have thrown light upon the subject. Researches carried out in South Africa and in New York showed that there are several distinct serological types of pneumococci, and that antisera agglutinate their homologous strains and protect susceptible animals against infection by them. Three specific groups of pneumococci are recognised, Types I., II., and III. Strains which do not fall into these divisions are classed together in a heterogeneous group IV. or "x." Cooper and others have now shown that group "x" may be subdivided into a large number of specific types. To date some 22 different serological strains have been recognised.

Types I. and II. are responsible for 50–75 per cent. of the cases of pneumonia, but the exact proportion varies in different places at the same time, and at different seasons in the same place. Type III. is the least common but the most virulent; group "x" is more common and less virulent than III.; the virulence of I. is about the same as "x," while that of II. is intermediate between these and III.

The first requisite in the treatment of pneumonia by antiserum is the detection of the type of pneumococcus active in the particular case; the second is the supply of the corresponding antiserum, for it is useless to administer an antiserum which does not correspond to the active organism. At present effective antisera are only available for Types I. and II. pneumonias, but these infections constitute more than half the cases. The serum is antibacterial, not antitoxic—the pneumococcus has no demonstrable exo- or endo-toxin—and its function is to supply opsonins, agglutinins, precipitins, &c., which hasten the phagocytosis and destruction of the pneumococcus. It does *not* cause quicker resolution of the pathological lesions in the lungs, prevent death from cardiac failure or anoxæmia, neutralise non-specific poisons in the blood, or obviate the necessity for surgical interference in empyema.

The detection of the infecting type is a task which necessitates the loss of valuable time, typing from the sputum requiring nearly 24 hours, and from blood or lung cultures even longer. This is unfortunate, for the success of serum treatment is well known to depend upon *early* administration. Our practice, in consequence, has been to institute serum treatment as soon as the clinical diagnosis is made in *every* case of pneumonia, and to continue until the patient is better or we know that the type of organism is other than I. or II.

The series now recorded is too small for any definite conclusion as to the value of serum treatment in pneumonia to be reached, but in view of the importance of the subject we present our present figures for the consideration of the profession. Our results are gratifying in so far as they suggest that the use of serum has lessened, to an appreciable amount, the mortality of the disease in our practice, but too much must not be expected from serum treatment. Death, in pneumonia, may result from many causes, cardiac and respiratory failure, intoxications other than pneumococcal, or complications, side-issues of the infection, or the result of associated infections, or antecedent visceral disease. Against these the serum has no direct response.

We are indebted to the kindness of Dr. J. G. M. Bullowa, clinical professor of medicine in the University of New York, for our supply of Felton's serum, manufactured by the Lederle Antitoxin Laboratories; to the managers of the Royal Infirmary, and Dr. A. S. M. Macgregor and Dr. W. G. Clark, for their cordial coöperation in our work; and to the Scottish Branch of the British Red Cross Society for the financial arrangements. To all of these we offer our sincere thanks. We must also offer our thanks, for their personal assistance, to J. G. M. Bullowa, Isobel Brown, G. Cooper, L. D. Felton, Ian Grant, F. Griffith, J. S. Haldane, D. Ross, and Geoffrey Fleming; and to our wards Sisters, I. N. Prentice and E. Esplin.

Causes of Death in Pneumonia.

In pneumonia death may result from cardiac failure, anoxæmia, intoxications, or complications.

CARDIAC FAILURE.

The exact causes of cardiac failure are not yet accurately appreciated. It is true that granular, fatty, and hyaline changes are usually found post mortem in the myocardium, and that inflammatory changes are common. It is recognised that additional strain is thrown upon the right heart by the consolidation in the lungs, and that the blood pressure falls, sometimes to an extraordinary degree, during the course of the disease, but it is not clear how much of the circulatory difficulties are due to failure of the vis a tergo, and how much to disturbances in the peripheral circulation, from vaso-motor paresis. Both factors must be borne in mind. In any case it is essential to lessen the strain upon the heart from the commencement of the illness.

The chief indications are rest in bed and full nursing. Sleep is required, and there must be no

* The expenses of this mass test of Felton's serum have been borne by a grant from the Scottish Branch of the British Red Cross Society to the Royal Infirmary for the purposes of this investigation.

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hesitation in securing it, if necessary, by the help of sedatives, of which we have found morphia given hypodermically the most helpful. It is true that its administration has been shown to lessen the respiratory rate to a slight extent (5 per cent.), and in consequence the oxygenation of the arterial blood, but this contra-indication is of less moment than the absence of rest and sleep, and can be remedied by the measures suggested for the treatment of anoxæmia. The occurrence of pleural pain is an additional indication.

Food, too, is essential and must be fluid. Diluted milk forms the staple, and readily digested carbohydrate (Horlick, Benger, &c.) can be added, or sugar in weak tea or coffee. Any distension of the abdomen must be remedied by alteration of the diet, and the use of rectal tube, enemata, and pituitrin.

Stimulants are generally required at some stage of the illness. Alcohol is said to be inert as a cardiac stimulant, but its effects in dilating the superficial vessels of the body and so increasing the heat loss, depressing the higher cerebral centres and so tending to ensure rest, and as a food which needs no digestion, are often useful. It should always be given to alcoholics. If the pulse lessens in rate and increases in value, if cold extremities tend to warm, if restlessness and delirium decrease, and the tongue becomes more moist, its administration is proving helpful (Murchison). The digitalis group are useful in moderate doses, and can be aided by caffeine and theobromine. Pituitrin should be exhibited if there are any suggestions of vaso-motor failure.

ANOXÆMIA.

The appearance of cyanosis is a clear indication of the presence of anoxæmia which occurs, to some extent, in every case of pneumonia. It is due to the lessened pulmonary area, the passage of blood through unaerated pulmonary capillaries, the lessened diffusion of gases from exudate in the pulmonary alveoli, and the shallow breathing which characterises pneumonia. It may be augmented in special cases by the existence of other pulmonary troubles such as bronchitis and pleural effu n. It has been shown by arterial puncture that anoxæmia may be extreme, the oxygen saturation being reduced to 60, 50, 40 per cent., or even lower, and that the administration of oxygen remedies the fault quickly and successfully. We have all seen such treatment remove, or at any rate lessen, cyanosis.

If the administration of oxygen remedies anoxæmia, anoxæmia should not be permitted to arise. In the past oxygen administration has been offered too late. Oxygen should be given in suitable amount continuously throughout the illness.

We have not had the opportunity of using an oxygen chamber. With it a concentration of 40-50 per cent. is used, generally the lower figure, with beneficial results. A concentration of 60 per cent. is deemed unsafe, but 40 per cent. has no ill-effect upon healthy persons sleeping under its influence. We have had to use other methods, Haldane's mask if possible, or the nasal tube. If these prove impracticable from delirium, &c., we exhibit oxygen freely through a funnel suspended above the patient's mouth. In consequence in this series cyanosis has rarely been severe.

THE INTOXICATIONS.

The intoxications of pneumonia are only in part due to the specific poisons of the pneumococcus, for it seems clear that anoxæmia and autolysis of the pulmonary lesions must interfere with normal metabolism. The prompt removal of these abnormal products is indicated and can be facilitated by increased elimination through the bowel, the skin, and the kidneys. The first indication is the supply of sufficient fluid which may be given with the milk or separately as lemonade, soda water, &c. We have, too, regularly administered potassium citrate (80–160 grains per diem) and liquor ammonii acetatis (4–8 drachms). The ammonia increases the formation of urea which acts as a diuretic, while the potassium salt also augments the urinary output, and, in addition, tends to increase the available alkali of the blood (Cushny).

It is impossible in this paper to discuss in full the vexed question of the acid-base balance in pneumonia. It has been known for long that in pneumonia there is as a rule a diminution of the CO_2 content of the arterial and the venous blood, though there is no appreciable lessening of the CO_2-combining powers of the blood. Various observers, using electrometric methods or indirect methods of measuring the pH of the blood, have concluded that it lies either within the somewhat discrepant range of normality or is definitely shifted towards the alkaline side. On the other hand, it has been repeatedly shown that the urine during the febrile stage of the disease is definitely acid, from an increased excretion of organic acids and acid salts. The ammonia output, too, is also increased.

In this series, in which alkalis were being exhibited, the reaction of the urine was noted accurately in 34 patients who recovered from the illness. The urine was alkaline to litmus before the termination of the fever in 9 cases; on the day of termination of the fever in 6 cases; on the first day afterwards in 6 cases; on the second day in 4 cases; on the third day in 4 cases; and subsequently in 5 cases. In 4 fatal cases the urine was alkaline before death.

On the available evidence we are inclined to trust the physiological evidence of the kidneys, which are clearly compensating an increased acidity of the tissues, rather than the evidence of the chemical examination of the blood. We continue the administration of the above-mentioned drugs for several days after the cessation of the fever, as it is known that the increased nitrogen output continues for several days after the fever has passed.

The Pneumococcal Intoxication.

On the admission of a patient blood is at once taken for culture and, immediately afterwards, a dose of 10,000 units of Types I. and II. serum is given intravenously. As a rule we have given a similar dose every eight hours until the fever fell below 102°, but we have not adhered strictly to the rule, giving more or less frequent doses according to the general condition of the patient rather than to the height of the fever. The signs of toxæmia, delirium, exhaustion, incontinence, &c., are more dependable criteria. In all we have given 348 doses to 58 patients, an average of 6, the extremes being 26 and 1.

We have not followed the bacteriological evidence as to type strictly, for we have found that the first examination of the sputum is not necessarily correct, presumably from contamination by bacteria derived from the mouth where, as is well known, pneumococci, most frequently group "x," are often present in healthy individuals. In one early case, which ultimately proved fatal, we unfortunately ceased administration of the serum on the sputum report of a group "x" infection, until the results of the blood culture proved that the infection was Type II. Cultures from the blood or lung are more likely to be accurate. Latterly we have continued the use of

serum in every case until satisfied by *repeated* examinations that the infection was *not* Type I. or II.

In 4 cases the sputum report was group "x," while blood culture showed Type I. in 2 cases, and Type II. in 2 cases. In 3 cases with negative blood cultures the first sputum reports were group "x," subsequent examinations showing Type I. in 1 case, and Type II. in 2 cases.

The administration of large doses of serum, intravenously, necessarily entails the risk of anaphylaxis, but the Felton serum is manufactured in such a way as to minimise this risk. It is derived from the serum protein of immunised horses by precipitation of the globulin antibody-carrying fraction in a large bulk of distilled water, the precipitate being redissolved in concentrated solution so that the therapeutic dose measures about 10 c.cm. A conjunctival test of sensitivity is made before the first injection.

In this series anaphylactic phenomena occurred in six cases. Immediate reactions occurred in two cases, succeeding the administration of the first dose. The patients became very short of breath and cyanosed, and the pulse failed, but these symptoms rapidly disappeared on the exhibition of adrenalin and atropine. In one case a second dose produced a similar but less severe reaction; the other patient did not require a second dose. In two cases urticarial eruptions were noticed a few hours after the first dose of serum. Late reactions occurred in two cases. In one patient who had had ten doses pyrexia, accompanied by arthritis, ensued on the twelfth day of illness and persisted for seven days. In the other case pyrexia, accompanied by inguinal adenitis, occurred on the fourteenth day of illness and persisted for eight days. This patient had had 11 doses, all given through the veins of the arms. Neither patient was acutely ill.

Discussion.

During the period of this investigation 60 cases of pneumonia were admitted into the wards. Of these, three patients were not given serum, for various reasons; they all made a good recovery. The other 57 patients were given serum. To these we have added another case, admitted in December, 1929, who received serum which had been presented to us by Dr. Bullowa. Of this series of 58 cases one patient (Type III.) died within 24 hours of admission. The others survived for at least 48 hours.

This series of cases is too small for any accurate conclusion as to the value of the treatment to be reached. We have no definite standard for comparison, but we show the results in an *untyped* series, treated by us in the same wards during the last 20 years.

It is well known that the mortality of pneumonia varies considerably from year to year according to the character of the epidemic; and varies, too, with the age and sex and constitution of the patients. In our old series the males numbered 73·3 per cent., in the new series 65·5 per cent. In the old series the patients under 40 years of age numbered 76·2 per cent., in the new series 75·8 per cent.

TABLE I.—*Mortality per cent. in Pneumonia not Treated with Serum.*

—	Osler.	Cecil.	Cole.	Bullowa.	Ferguson and Lovell.
Type I. ..	24·1	32·6	—	31·0	26
,, II. ..	37·7	54·6	—	39·0	29
,, III. ..	53·7	28·6	43·0	—	—
Group "x".	22·2	38·3	12·8	—	24·6

The patients were not a picked group. Four showed a positive Wassermann reaction; one had aortic valvular disease, and one fibrillating auricles; one suffered from phthisis; two had chronic otitis media; one had rheumatoid arthritis; three were clearly chronic drunks. The virulence of the disease was at least of average severity. The fever lasted for eight days or more in 11 cases, and touched or exceeded 103° F. in 23 cases. The pulse-rate touched or exceeded 120 in 27 cases. The respirations numbered 40 or more in 33 cases. The blood pressure fell below 100 mm. Hg in 13 cases.

There is great difference in the mortality of the various types of pneumonia as shown by different observers in Table I.

Our own results are given in Table II.

TABLE II.

	UNTYPED SERIES, 1906–29, omitting the war years, 1916–17–18.				TYPED SERIES, 1930. Treated with serum.		
Age.	Male.	Died.	Female.	Died.	Male.	Died.	Female*
0–09	77	4	45	3	—	—	—
10–19	151	4	55	2	8	—	2
20–29	155	16	43	5	13	1	8
30–39	99	22	28	7	8	1	5
40–49	60	27	29	6	6	3	3
50–59	49	28	14	5	2	1	—
60–69	35	20	6	2	1	—	2
70–79	7	6	3	1	—	—	—
—	633	127	223	31	38	6	20

* No deaths.

	MORTALITY. Without serum. Cases.	Deaths. %	With serum. Cases.	Deaths. %
All cases	.. 856	..... 158 (18·46)	58	..... 6 (10·3)
Males	.. 633	..... 127 (20·06)	38	..... 6 (15·7)
Females	.. 223	..... 31 (13·9)	20	 0

The reduction in the mortality is thus considerable. The incidence of the different types of pneumococci in a series of cases in Glasgow during the year 1930 is shown in Table III.

	Total series.	Serum treated series only.
Type I...	.. 68	15
,, II...	.. 88	26
,, III...	.. 3	1
Group "x"	.. 41	13
	200	55

Felton's serum is only active against Types I. and II. infections; it has no therapeutic value in Type III. and group "x" infections. Of the 15 Type I. infections 1 patient died; of the 26 Type II. 2 patients; of the Type III. the only case; of the 13 group "x" infections 2 patients. Grouping the Type I. and II. infections together and contrasting the results in the other groups the figures are:—

Types I. and II. 41 cases .. 3 deaths .. mortality 7·3 per cent.
Other types .. 14 ,, .. 3 ,, .. ,, 21·4 ,,

We have not, as yet, any records of Type I. and II. infections treated in this country without the aid of Felton's serum, save those of Ferguson and Lovell, but the contrast between the gross mortality in our old and our new series, and the considerable difference between the mortality of the Types I. and II. cases, and the others (*upon which this serum has no effect*) in our new series, are sufficiently suggestive of the value of Dr. Felton's addition to our therapeutic armamentarium.

The difference in the mortality of pneumonia in America and at home requires investigation. Dr. Bullowa suggests that our patients come under treatment at an earlier stage

of the disease than is the case in New York. In this series the serum treatment of Types I. and II. infection was commenced, so far as we can ascertain, within 48 hours of the onset of the illness in 16 cases; within 72 hours in 7 cases; within 96 hours in 10 cases; within 120 hours in 6 cases; within 144 hours in 2 cases. Two of the Types I. and II. patients who died received serum within 48 hours of the onset and one within 72 hours.

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A REPORT ON LOBAR PNEUMONIA:
TREATMENT BY CONCENTRATED ANTISERUM

BY THE PHYSICIANS TO THE ROYAL INFIRMARY, EDINBURGH.

IN the latter part of 1929 a quantity of concentrated antipneumococcus serum was made available by the Medical Research Council for clinical trial in the Royal Infirmary.

In order to show that a remedy is of benefit in the treatment of lobar pneumonia, it would be necessary to demonstrate that it is capable of (*a*) reducing the case-mortality; (*b*) modifying the course of the disease; or (*c*) lessening the severity of the illness. For various reasons the matter is not as simple as it would appear at first sight. Effects on the case-mortality present special difficulty, since the death-rate in pneumonia may vary within wide limits not only in different places, but also in the same institution from year to year under apparently identical conditions. Deductions from small series of figures are always unsafe, and especially in such a subject as pneumonia, where the course of the disease is influenced by so many factors, such as the age of the patient, his previous health, habits, &c. The severity of the illness cannot be readily measured,[1] and experience shows that even those patients apparently extremely ill may recover without specific treatment.

Scheme of the Investigation.

At the outset of the investigation it was decided to give serum treatment without distinction to every alternate case of lobar pneumonia admitted to each of the eight medical charges in the Royal Infirmary. The remaining cases were to be treated in the usual way and were to serve as controls. This plan was carried out for about two and a half months and the cases belonging to this period are designated by the letter B. (before) in Table I. Later, owing to the small quantity of serum available, instructions were issued to choose the more seriously ill patients for treatment with the antiserum. The later cases are indicated by the letter A. (after). As has been pointed out, the subjects in the earlier period (B.) were quite unselected, so the serum and control cases are strictly comparable. In the second period the serum groups contain a larger proportion of the more seriously ill. The non-serum controls in this group (A.) include the less severe cases. Certain patients who were practically moribund when admitted to hospital were not given serum and are shown primarily amongst the controls.

In order that the serum cases and the controls should satisfy statistical requirements, the two groups should be of approximately equal size and as nearly similar as possible in such matters as the age of the patients (see Table III.), their physical state, the day on which they were admitted to hospital (Table IV.), &c. Owing to the selection of more severe cases for serum treatment during the second period, the non-serum cases in this group are not strictly comparable. The results obtained in the two periods (B. and A.) are so similar, however, that it would seem justifiable to group them together for purposes of analysis. This, of course, would tend to operate to the disadvantage of the serum results.

The concentrated antipneumococcal serum employed was that of Felton prepared by Messrs. Lederle, of New York. It was active only against organisms of Types I. and II., and contained 10,000 units in

TABLE I.

Group.	Day of crisis. 3	4	5	6	7	8	9	Lysis or over 9.	Deaths.	Age at death and remarks.	Totals.
S. I. B.	—	1	4 (15)	—	1	—	1	1	—	—	8 } 12 } 29
S. I. A.	—	1	2	—	—	1	—	—	—	—	4 }
C. I. B.	—	—	2	2 (15)	1	2	—	1	4	27, 61, D. 62, 64, A.	12 } 17 }
C. I. A.	1 (11)	—	—	1	1 (13)	1	—	—	1	60.	5 }
S. II. B.	1	—	1	—	1	1	2	2	4	36, 38, A. 49, 52, K.	12 } 17 } 41
S. II. A.	—	1	1	1	1	—	—	—	1	21, P.	5 }
C. II. B.	—	—	—	1	1	—	—	2 (63)	6	34, N. 52, M. 57, M. 60, M. 62, M. 76.	10 } 24 }
C. II. A.	—	1 (11)	1	2	1	2	1	2	4	24, B. 51, 54, U. 64, F.	14 }
S. III.	—	—	1 (60)	—	1 (60)	—	—	—	—	—	2 } 2
C. III.	—	—	—	—	—	—	—	—	—	—	— }
S. IV.	—	—	2	1	2	—	1	—	1	—	7 } 17
C. IV.	—	1 (14)	1	—	—	—	—	5 (15)	4	19, St. 60, 64, L.	10 }
Untyped S.	—	—	—	—	—	—	—	1	1	17, M.	2 } 17
Untyped C.	—	—	1	1	3	2	1	3	4	50, M. 54, M. 68, M. 76, M.	15 }
Summary of Types I. and II.											
S. I. + S. II.	1	3	8	1	3	2	3	3	5	—	29
C. I. + C. II.	1 (11)	1 (11)	3	6	4	5	1	5	15	—	41

Group.—S. = Serum; C. = Control. B. = before; A. = after. Figures in *italics* represent ages.
Remarks.—A. = alcoholic; D. = chronic bronchitis and diarrhœa. K. = meningitis and pericarditis; P. = pericarditis and extension; N. = nephritis; M. = died within 24 hours of admission; two were unconscious when admitted; B. = bronchitis and asthma; U. = ulcerative endocarditis; F. = auricular fibrillation; St. = mitral stenosis; L. = leukæmia.

each dose (5 c.cm.). As it has been shown that the earlier the serum can be administered the more favourable is the result likely to be, it was decided that the initial dose of serum should be given to the patients as soon as the diagnosis had been established and without waiting till typing of the organism had been completed. This resulted in a number of pneumonias of Types III. and IV. receiving one or more doses of serum before information regarding the type was available. This waste was more than outweighed by the advantage of being able to begin treatment earlier in the other cases. Table II. gives the number of doses received by patients in the different classes. Before serum was administered to a patient inquiry was made as to whether any

TABLE II.

—	Number of doses of serum given. 1	2	3	4	5	6	10	12
SS. I. + S. II. non-fatal	4	9	3	6	—	—	1	1
SS. I. + S. II. fatal	—	2	2	—	—	1	—	—
S. III.	1	1	—	—	—	—	—	—
S. IV.	2	3	—	1	1	—	—	—
Untyped	—	2	—	—	—	—	—	—

serum had previously been given, and the presence of undue sensitivity was sought by placing a drop of normal horse serum in the conjunctival sac. During the period covered by the inquiry 106 cases of lobar pneumonia came under review. For various reasons (e.g., absence of sputum) typing was not carried out in 17 of the subjects. The remaining 89 cases were distributed as follows: Type I., 29; Type II., 41; Type III., 2; and Type IV., 17. The serological type of the pneumococci present in the sputum was determined by the usual macroscopic agglutinate method after mouse inoculation. Details of the technique and an account of the type incidence in Edinburgh during the years 1929-30 are being published by J. M. Alston and D. Stewart.[2]

LUNG PUNCTURE.

In certain cases in this series—most frequently in those admitted at an early stage in their illness—no sputum could be obtained for several days and occasionally not until actually after the crisis. By puncture of the lung substance over the affected lobe it was found that in the majority of such cases a pure

TABLE III.

—	Age of pneumonia cases types I. and II. 10–19	20–29	30–39	40–49	50–59	60–69	70+	Totals.
S. I. + S. II. non-fatal	4	5	9	2	4	—	—	24
S. I. + S. II. fatal	—	1	2	1	1	—	—	5
C. I. + C. II. non-fatal	7	7	4	4	3	1	—	26
C. I. + C. II. fatal	—	2	1	—	4	7	1	15

culture of the pneumococcus could be obtained. The technique of this procedure and the results obtained have already been recorded.[3]

BLOOD CULTURE.

In 51 cases blood culture was performed. Ten cubic centimetres of whole blood was removed from the arm by venepuncture and was immediately transferred to flasks containing 50 c.cm. of phosphate broth (pH 7·6). The flasks were then incubated for 72 hours, being examined at daily intervals. A

TABLE IV.

—	Day of disease on admission to hospital. 1	2	3	4	5	6	7	8	Unc.	Totals.
S. I. + S. II. non-fatal	1	4	7	6	3	2	—	—	1	24
S. I. + S. II. fatal	—	—	2	—	2	—	—	1	—	5
C. I. + C. II. non-fatal	—	4	6	5	6	4	1	—	—	26
C. I. + C. II. fatal	—	—	2	3	3	2	1	1	3	15

Unc. = Uncertain.

positive result was recorded in 6 of the 51 cases, in each case a pure culture of pneumococcus being obtained corresponding in type to that found in the sputum. No growth of pneumococcus was noted in 45 cases.

The majority of the blood cultures were done in cases that were admitted early in the investigation,

and it is interesting to note that death occurred in all cases where a positive culture was obtained; while no patient who survived showed a positive blood culture.

Analysis of Results.

CASE MORTALITY.

A summary of the findings is given in Table I. The total figures are so small that it hardly seems justifiable to express the results as percentages. The distribution of the deaths, however, is striking. It will be observed that amongst the Type I. cases none of those who received serum died, while there were five deaths in the control group. Similarly amongst the Type II. pneumonias there were considerably fewer deaths in those treated with serum. At first sight this would appear to be convincing evidence in favour of the serum, but closer scrutiny modifies this view. It is well known that the death-rate in pneumonia increases with age, rising from about 5 per cent. under 20 years, to about 100 per cent. over age 70.[4] The serum cases and the controls are not closely similar in matter of age, since only the latter group contains subjects of 60 years and over (Table III.). In the first two groups all the patients of this age died with the exception of one. It will be noticed that though two cases of 60 years of age affected with pneumococcus of Type III. survived their illness, all the others of like age in Group IV. and in the untyped class ended fatally. In addition, it will be observed that several of the patients who did not receive serum died within a few hours of reaching hospital, two were moribund on admission, and others were extremely ill and may have been adversely affected by being moved to the infirmary late in the course of the disease. When consideration is given to these facts the smaller proportion of deaths amongst the serum cases would appear of less importance.

EFFECT OF SERUM TREATMENT ON THE COURSE OF THE DISEASE.

Duration of the fever.—As is well recognised, it is often difficult to ascertain exactly the day upon which the pneumonia commenced. A large proportion of the subjects in this investigation had suffered from some "cold" or catarrhal condition for a week to a month before the onset of symptoms which could be definitely recognised as pneumonia. The earliest signs of the major disease may either be those of an abrupt febrile invasion, or local symptoms referable to the chest. There is thus often an element of doubt as to the exact duration of the illness, but every effort has been made to minimise this. The day of the disease on which the patients of Groups I. and II. came under treatment is shown in Table V. It will be observed that the majority of the patients were not admitted to hospital until after the third day of their illness.

TABLE V.—*Fall of Temperature in Relation to First Dose of Serum.*

Interval to crisis.	Day of disease on which serum given.							Totals.
	1	2	3	4	5	6	Unc.	
1 day and under	—	1	2	3	3	—	—	9
2 and 3 days ..	—	1	2	2	—	3	—	8
4 days and over..	1	1	2	1	1	—	1	7

A great deal of information regarding the duration of the febrile period in this disease is available as a standard for comparison. Many analyses have been published showing the proportion of cases which end by crisis on different days of the disease.[4] From these it is evident that, while in the majority of pneumonias the temperature begins to fall from the sixth to the eighth day, there are many which run a shorter course. The accompanying chart compiled from twelve series of records shows the percentage distribution of the crisis in 7442 cases together with the limits of the figures given by the individual observers (shaded area). Taking the records of all the pneumonias of Types I. and II. together and omitting the fatal cases, it is found that 24 were treated with serum and 26 are available as controls. The average age of the non-fatal serum cases is 33·8 and that of the surviving controls 32·0 years, so that the two groups are fairly comparable. When the duration of the illness is examined, there is at once apparent a very marked difference between the two groups, especially in the case of Type I. No less than 50 per cent. of the serum cases ended critically on or before the fifth day, while the corresponding figure for the controls is only 19·2 per cent. (The value for the 7442 cases mentioned above is 26·0 per cent.) When it is considered that the later serum cases include some of the more severely ill patients, and that eight of the patients did not commence treatment until the fifth day or later, the result is even more striking. Experience has shown that abortive forms of the disease occur more frequently amongst young individuals, cases of three or four days' duration being not uncommon amongst children. In order to give weight to this point, the ages of all patients under 15 years of age are shown in italics in Table I. It is probable that the figures for the control group gain advantage from the inclusion of two patients aged 11 who had a crisis on the third and the fourth day respectively. The accompanying chart shows the percentage distributions of the serum cases and the controls according to day of crisis. Each group includes a single third-day crisis—a proportion to be expected from the published tables. The values for the fourth and especially for the fifth day in the case of the serum group are greatly in excess of expectation, while the later values are necessarily low. In the case of the control series, the figures lie fairly close to the average values within the limits expected. Of the 50 non-fatal cases of Types I. and II. it is well to notice that 18 who received serum and 15 controls were admitted on or before the fourth day, 3 serum cases and 6 controls on the fifth day, and 3 serum cases and 5 controls after the fifth day (Table IV.). Though the lateness in beginning specific treatment in certain cases would affect the total number of early crises, the two groups are fairly similar as regards time of admission to hospital. From the evidence submitted, it would seem a fair deduction that the administration of serum has definitely shortened the febrile period of the disease in a considerable number of cases. Table IV. shows the number of days which elapsed from the time of giving the first dose of serum to the onset of the crisis. No less than 9 of the cases who were admitted up to the fifth day of the illness had a definite crisis within twenty-four hours (second day, 1 case; third day, 2 cases; fourth and fifth day, 3 each). On the other hand, early administration of the serum is not necessarily followed by abortion of the disease. For example, the patient (Case 2) who commenced treatment within 24 hours of the onset of his illness and received 12 doses of serum did not have his crisis until the sixth day.

EFFECT OF SERUM ON THE SEVERITY OF THE ILLNESS.

Height of the fever.—Thermal reactions following the administration of serum have been reported.[5] These have not been seen in this series of cases. In a number of instances the giving of serum has been followed by a slight temporary fall of temperature of one or two degrees, but variations of this magnitude are not uncommon during the course of pneumonia. One or two cases appear to have a pseudo-crisis, but where

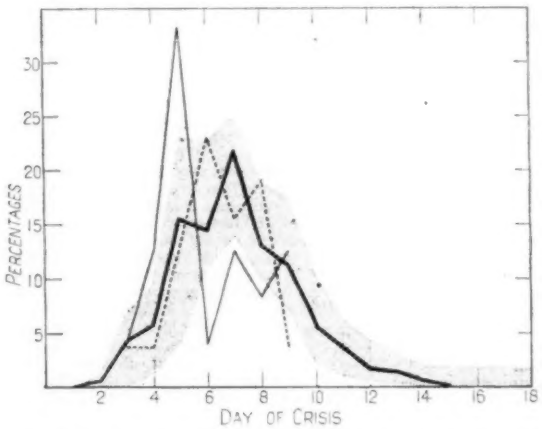

Chart shows the relative percentage distribution of the day of crisis in 7442 pneumonias which ended by crisis. The average values are shown by the heavy black line. The extreme limits given in the 12 different series from which the cases were drawn are shown by the shaded area. The control cases in this series (interrupted line) fall within expected limits. Serum cases (fine line) show a large percentage of crisis occurring on the fourth and fifth days of the disease.

a fall to normal occurred, the temperature usually remained down. In certain cases the impression was gathered that the serum, although it did not make the patient afebrile, kept the temperature at a lower level than is usual in pneumonia.[5] Except where a definite crisis occurred the pulse-rate and respirations were not usually influenced by the giving of serum. The temperature-reducing effects of the serum appear to be more marked in cases of Type I. than in those of Type II.

Leucocytosis.—In a number of cases observations in the leucocyte count were made daily. The usual reaction appeared to be a fall in the number of leucocytes, roughly in proportion to the change in temperature; an increase in white cells was only found in one patient

Blood pressure.—No striking change in systolic readings was observed.

There is no doubt in the minds of those who were watching the patients that the antiserum was of considerable benefit in certain cases even although the course of the illness was not shortened. Many of the patients appeared to have improved rapidly, becoming more comfortable and less distressed shortly after the serum had been given. (See Case 2.) Clinical histories of cases illustrating some of the more striking results are given below.

Illustrative Cases.

CASE 1.—Youth aged 18. Gave a history of "cold, cough," "not feeling well," for seven days before admission. Continued at work till two days before admission. Pain in left side of chest, cough worse, vomiting, headache two days before admission; and spitting of blood one day before admission. Examination: Consolidation of the left lower lobe; well nourished; development good; acutely ill but no marked distress; temperature 102°, pulse 120, respiration 20–30. Blood culture—negative (twice). Sputum and lung puncture gave culture of pneumococcus II. Progress: Given one dose of serum on admission, at 8.45 P.M., on the third day of the disease. Conjunctival test negative. Following the injection the patient had a serum reaction like asthma, with urgent dyspnœa, cyanosis, and pain in the chest. One cubic centimetre of adrenalin eased the symptoms immediately. This injection was followed by a fall in temperature of 1° with consequent rise of 1·6° after six hours. Eighteen hours after admission there was sudden rise of temperature to 104·8° and he was given a second dose of serum. No anaphylactic phenomena followed this injection. After this the temperature came down steadily to normal, within 24 hours of admission and six hours after the second dose of serum. The fall in temperature was accompanied by all the typical signs of crisis. A very definite change was noted within a few hours of giving the second dose, not only in the temperature but also in the clinical condition of the patient. The ward sister, especially who has had considerable experience in nursing pneumonia patients, was impressed by the immediate improvement.

A similar asthmatic attack occurred in one other patient who had previously suffered much from bronchitis. He had never had asthma, and the preliminary eye test was negative.

CASE 2.—A man, aged 28, had had pain in left side of chest for one day before admission with slight cough, and shivering. He was admitted on the second day of illness. Examination: Consolidation of the left lower lobe. Patient extremely ill; collapsed; cyanosis marked. Temperature 101–103°; pulse 130–140; respiration 40–50. Blood culture negative (three times). Sputum, pneumococcus II. Progress: This patient was admitted within 24 hours of the onset of the illness, in a very critical condition. The prognosis was noted at the time as "almost hopeless." The white blood count was low, 8000. In all he received 12 doses of serum, injections being repeated every six or eight hours for five days. During that time "life hung in the balance." By the sixth day, however, definite signs of improvement were noticed, and by the seventh day it was obvious that the patient was going to live, all signs of crisis being present.

It is interesting to note that there was a gradual fall, both in pulse-rate and in respiration-rate, from the first dose of serum, although the patient did not seem to be making much headway. The ward sister, who also has had large experience in the nursing of pneumonia patients, attributed the recovery to serum. After the third and fourth doses of serum both doctors and nurses clearly noticed signs of improvement—less restlessness leading to natural sleep, less apathy, more coherent speech, sweating, and increased quantity of urine.

CASE 3.—A man, aged 39, had pain in the left side, with cough and insomnia for three to four days before admission. Examination: Consolidation of the left lower lobe. Blood culture negative. Sputum, pneumococcus I. White blood count 9000. Temperature 103°; pulse 100; respirations 40–50. Progress: This patient was chosen as a serum case because of the severity of his condition. Admitted on the fourth day, he was collapsed, cyanosed, and ashen-grey in colour—in short, extremely ill. He received one dose of serum two hours after admission, and within four hours his temperature had fallen to 99·5°. In another eight hours it had fallen to 97° F. A second dose was given 18 hours after admission, but by this time—that is, before the end of the fourth day—the crisis had occurred.

CASE 4.—Boy, aged 16, was feverish, with vomiting six days before admission; on the next day he had cough and pain and on the third day rusty sputum. Admitted on fifth day. Examination: Consolidation of right lower lobe. Well-nourished adolescent; no marked distress but severely ill. Temperature 103°; pulse 120; respirations 30. Blood culture negative; sputum, pneumococcus II. Progress: Admitted on the fifth day, one dose of serum was given at once. This was followed by a fall in temperature of 2°. A second dose of serum four hours afterwards was followed by relief, and by a fall of temperature to normal. A slight rise of temperature to 101° occurred eight hours afterwards, and a complete crisis took place 12 hours later. The recovery was uneventful.

CASE 5.—Man aged 30. Pain and cough for two days before admission; vomiting and rusty sputum for one day. The patient was moderately alcoholic. Examination: Consolidation of the left lower lobe; nutrition and development good; cyanosis; marked dyspnœa. Blood culture negative (twice), sputum, pneumococcus II. Progress: Reaching hospital on the third day of his illness, the patient was given a dose of serum, followed by further three doses at four-hourly intervals. Crisis occurred within 24 hours, with very marked improvement in general condition.

CASE 6.—Man aged 45. Indefinite "flu" 14 days before admission. Severe pain and vomiting three days before

admission, and headache; weakness two days. Examination: Consolidation of the right lower lobe; thin; nutrition poor; marked cyanosis; very marked distress; painful cough; rusty sputum; drowsiness marked. Temperature 104°; pulse 130; respirations 30–40. Blood culture negative (twice). Sputum, pneumococcus II. Progress: When admitted to hospital on the third day of the disease patient was in a collapsed condition. Three injections of serum were given within 24 hours followed by very marked improvement, and crisis occurred by the fifth day of the illness.

Summary.

The evidence submitted suggests that the administration of Felton's concentrated antiserum is of distinct benefit in the treatment of lobar pneumonia due to organisms of Types I. and II. Its action appears to be greater in the case of Type I. pneumonias. The records show that there were fewer deaths amongst the cases who received serum. Serum treatment seems to lessen the severity of the disease and undoubtedly shortens the febrile period in a proportion of cases. Many cases appeared to become less ill and more comfortable as a result of the injections. Anaphylactic phenomena were observed in two patients after the first dose of serum, although in both cases the preliminary eye test was negative. It is probable that the beneficial results would have been more striking had it been possible to commence treatment at an earlier stage in the disease, and if the supply of serum had permitted more frequent injections.

The writers wish to acknowledge their indebtedness to Dr. J. M. Alston and Dr. Donald Stewart and to Prof. Stanley Davidson for help in carrying out the investigations.

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THE INFECTIVE FACTOR IN THE CAUSATION OF ACUTE MYELOGENOUS LEUKÆMIA.

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THE following observations on three cases of acute myelogenous leukæmia lend support to the opinion of Dr. F. J. Poynton and Dr. A. A. Moncrieff [1] that the tissues, and the blood-forming organs in particular, are capable of reacting to infective processes in a great variety of ways and in varying degrees. The main features of these cases are an intensely severe sepsis in the mouth, associated with a marked and increasing secondary anæmia, and a white count in the early stages showing a leucopenia affecting the granular cells, followed by the appearance of a leukæmic blood picture of myelogenous type.

CASE 1, a male aged 19, was admitted to hospital on Nov. 12th, 1928, with a history of increasing weakness, giddiness, and headaches, following the lancing of an "abscess in the mouth" two months previously. A severe epistaxis necessitated his admission for blood transfusion. There was nothing of importance in his previous history; he was an average, healthy male.

He was markedly pale, with the right side of his face (around the mouth) puffy and swollen; he had difficulty in opening the mouth. There was a high temperature of swinging type (103°–100°), a pulse-rate of 120, and a respiration-rate of 30. There was a severe ulcerative condition of the mouth; the gums were swollen and œdematous, and oozed blood-stained muco-pus. The cervical glands were enlarged and tender. The heart was dilated, and an apical systolic murmur was present. The spleen and liver were not palpable. There were a few scattered petechiæ over the trunk.

Blood Counts.

(1) Red cells. (2) White cells. (3) Hæmoglobin. (4) Colour-index. (5) Polymorphonuclear cells. (6) Lymphocytes. (7) Large mononuclear cells. (8) Myelocytes. (9) Leucoblasts.

—	Nov. 12th.	Dec. 7th.	Dec. 17th.	Dec. 24th.	Dec. 31st.
(1)	738,000	2,172,000	1,824,000	2,016,000	896,000
(2)	800	27,200	66 400	24,000	10,600
(3)	15%	36%	28%	30%	18%
(4)	1·0	0·85	0·8	0·74	1·0
(5)	18%	18%	10·5%	17%	11%
(6)	82%	17%	3·5%	7%	7%
(7)	—	0·5%	—	—	—
(8)	—	35·5%	26·5%	18·5%	13%
(9)	—	29·0%	59·5%	57·5%	69%

Anisocytosis and poikilocytosis were present in all counts. Normoblasts were seen in the later counts.

Pathological Tests.—A culture from the teeth gave hæmolytic streptococci, but blood cultures were negative. A gastric test-meal showed complete achlorhydria. The van den Bergh reaction was within normal limits.

The patient had several blood transfusions, local dental and oral treatment, and an autogenous vaccine. The spleen became palpable about the beginning of December. His general condition improved considerably until towards the end of December. He died on Jan. 1st, 1929.

Necropsy.—The body was emaciated. There were petechial hæmorrhages scattered over the trunk and upper limbs. The lungs showed early diffuse broncho-pneumonia. The heart was dilated, flabby, and pale. The liver (5 lb. 2 oz.) was large, fatty, and a tawny-red colour. Free iron was present. The spleen (1 lb. 1 oz.) was large, soft, friable, and purple. The swollen pulp obscured the trabeculæ. The marrow of the sternum was a muddy grey colour; that of the tibia was reddish-grey.

Microscopical Appearances.—The spleen and the marrow from the long bones showed extensive myeloid hyperplasia. Many normoblasts were present in the marrow. Section of the liver showed severe fatty change around the portal radicles. Collections of immature myeloid cells were numerous in the portal spaces.

CASE 2, a female aged 28, was admitted to hospital on March 1st, 1929, with a four months' history of increasing lassitude and giddiness. Her teeth had been bad for some time, but her doctor told her that nothing could be done till she was stronger. A fortnight before admission she developed an acute feverish illness, which was associated with a sore-throat and swollen face.

Her appearance bore a striking resemblance to that of the previous case. The temperature was 103° and swinging in type, the pulse-rate 140, and the respiration-rate 30. Pallor was marked, and her face was so swollen around the mouth that the latter could only be opened with difficulty. There was noticeable fœtor of the breath. The gums were swollen and œdematous and almost completely obscured the teeth. The discharge from the gums was serous rather than purulent. Severe stomatitis was present. The cervical glands were enlarged and tender. The heart was not noticeably enlarged; the sounds were feeble and tic-tac in character. Bronchitis was present. The spleen was palpable one inch below the costal margin and was rather soft.

Blood Counts.

—	March 1st.	March 22nd.
Red cells	1,408,000	884,000
White cells	5,200	19,800
Hæmoglobin	32%	19%
Colour-index	1·1	1·12
Polymorphonuclear cells	54%	57%
Lymphocytes	43%	18·5%
Large mononuclear cells	3%	0·5%
Myelocytes	—	4%
Leucoblasts	—	20%

Anisocytosis and poikilocytosis were present in both counts. There were 140 normoblasts per c.mm. in the first count.

Pathological Findings.—A culture from the teeth yielded hæmolytic streptococci, but the blood culture was negative, the van den Bergh reaction normal.

In spite of rigorous local treatment and repeated mercurochrome injections intravenously, the patient went downhill

[1] THE LANCET, 1930, ii., 787.

and died 21 days after admission. The spleen became impalpable towards the end.

Necropsy.—The body was emaciated. There were raw ulcers on the sides and roof of the mouth, with adherent sloughs. There was severe necrosis of the maxilla and the sides of the body of the mandible. There was a diffuse bronchitis, and bronchiolitis and the lungs were congested and œdematous. The heart was pale and flabby. The liver (3 lb. 11 oz.) was fatty and brownish-yellow in colour, interspersed with small discrete yellowish areas. The spleen (7 oz.) was rather soft, but the pulp was not noticeably swollen and the trabeculæ were easily made out. There were three dark purplish areas about the size of a halfpenny in the splenic substance. The marrow of the ribs was dry and yellow; that of the sternum and tibia was greyish-red.

Microscopical Appearances.—Section of the spleen showed little evidence of myeloid hyperplasia; the reticular structure was prominent. The liver showed collections of immature white cells of myeloid type. The marrow showed myeloid hyperplasia.

CASE 3, a female aged 59, was admitted on Jan. 30th, 1929, with severe epistaxis and nasal obstruction. Three months previously she had had similar bleeding from the nose, which had to be plugged. She had lost much weight recently. There were no important features in her past or family history.

She was noticeably pale and looked ill, with obvious nasal obstruction. She had a well-marked saddle-shaped nose (an appearance which she said had been present for 30 years). The temperature varied between 100·5° and 98°, and was of swinging character; the pulse-rate was 100, and the respiration-rate 22. Breathing was entirely through the mouth. Fœtor of the breath was noticeable. Her few remaining teeth were septic. There was an old perforation of the palate. The tongue was furred, and numerous ulcers covered its surface. The anterior pillar of the fauces, the tonsils, and the posterior pharyngeal wall were red and œdematous, with adherent greyish sloughs in places. The heart was dilated, and a systolic murmur of relative mitral incompetence was present. The spleen was palpable, one and a half inches below the costal margin, of firm consistency. The liver was felt one inch below the costal margin and was firm, with smooth surface and sharp edge. There were a few shotty glands in the groin. The tonsillar glands were enlarged. There were no abnormal signs in the nervous system save a bilateral eighth-nerve deafness. The urine had a specific gravity of 1020; a trace of albumin was present but no casts. Numerous petechiæ were seen scattered over the trunk and lower limbs. The Wassermann reaction was doubtful.

On Feb. 11th numerous red patches appeared on her arms and face; these varied in size from that of a pea to large areas, some three inches in diameter. They were raised above the skin surface with definite edge, and were of firmer consistency than normal skin. By Feb. 22nd the whole of the extensor surfaces of both arms and hands were covered by this infiltrative, hæmorrhagic, sharply marginated eruption. The upper parts of the face, the nose, the eyebrows, and the skin up to the roots of the hairy scalp in the frontal region showed a similar but less marginated rash. Both epitrochlear glands were palpable at this stage. During this time the throat condition had improved considerably under treatment. On March 1st the leukæmic infiltrations had begun to disappear, leaving a bruised appearance with surface desquamation. The spleen had not altered in size or consistency. The patient was obviously going downhill rapidly. Unfortunately her relatives took her out of hospital on March 22nd and she was lost sight of.

Blood Counts.

(1) Red cells. (2) Nucleated red cells. (3) White cells. (4) Hæmoglobin. (5) Colour-index. (6) Polymorphonuclear cells. (7) Lymphocytes. (8) Myelocytes. (9) Myeloblasts.

	Feb. 4th.	Feb. 23rd.	March 7th.	March 22nd.
(1)	1,732,000	1,500,000	1,336,000	1,152,000
(2)	200	400	670	870
(3)	6,400	42,600	44,600	15,800
(4)	36%	25%	20%	18%
(5)	1·06	1·17	0·77	0·8
(6)	26%	32%	52%	33%
(7)	5%	6·5%	3·5%	3·5%
(8)	55%	59%	40·5%	37·5%
(9)	14%	2·5%	4%	26%

DISCUSSION.

It is hard to believe that a clinical picture such as has just been described could be produced by the lowering of the patient's resistance by a process which affects the blood-forming organs and of the nature of which we are completely ignorant. We must, therefore, be drawn to the conclusion that infection is the essential cause. We are not concerned here with any specific factor; my intention is merely to put forward the theory that the blood-picture in many cases of acute myelogenous leukæmia is a special response of the hæmatopoietic system to a virulent infection.

The process seems to be evolved in this way. The organism gains an entrance to the body, commonly at the site of septic tonsils or teeth, and sets up a severe local inflammatory reaction. The patient is ill, with high swinging temperature, tachycardia, toxic appearance, and perhaps a purpuric rash. In certain cases at first the blood-forming tissues are paralysed, and the individual puts up no resistance. At this stage examination of the blood shows a profound secondary anæmia and marked leucopenia. Many cases are reported in which death has occurred at this point and in which the diagnosis has been "agranulocytic angina," "aleukæmic leukæmia," or "aplastic anæmia," diagnoses which depend on certain small characteristics of the blood picture. If the infection is resisted successfully, the blood-forming organs work hard to overcome it. A blood examination will show evidence of marked activity, with the presence of normoblasts, myelocytes, and myeloblasts. The liver, spleen, and marrow would show evidence of hyperplasia on the part of the reticulo-endothelial cells. There is a striking similarity, surely, between this picture and that of the response to the ordinary pyogenic infection, the only difference being in the actual degree of activity of the hæmatopoietic system. In certain cases of virulent infection with hæmolytic streptococci, for example, there is the same leucopenia in the initial stages, and death may occur. In a favourable case, however, a polymorphonuclear leucocytosis appears and the patient recovers.

It is obvious that there are two factors in the matter: one is the virulence of the organism, the other is the state of the individual's resistance. I would suggest that in cases of acute leukæmia the infection is a virulent one—in two cases hæmolytic streptococci were isolated—and that the individual has strong powers of resistance to begin with, but that it is in the great majority of cases overcome in the end. The fact that it commonly attacks healthy young adult males would support this. That every case of acute leukæmia is due to an infection is very difficult to imagine, far more so to prove, but I suggest that this causation is more frequent than is generally supposed. A recent review of the literature by Warren [2] goes far to support this. Experimental evidence has so far been conflicting. Several classical cases of the transference of the disease have been reported, but conclusive evidence is still wanting.

One conclusion certainly emerges from a study of these cases: that though our knowledge is still far from complete, there is great need for a restatement of our ideas on blood diseases in general with special reference to those directly due to infection.

I am indebted to Dr. A. C. D. Firth and Dr. C. F. T. East for permission to publish their cases.

[2] Warren, S. L.: Amer. Jour. Med. Sci., 1929, clxxviii., 490.

MOTOR LICENCE OF EPILEPTIC DRIVER.—Under the new Road Traffic Act, the Manchester Watch Committee have decided to revoke the driving licence of a private motorist reported to be an epileptic. It was stated that the driver was involved in an accident due to an attack of epilepsy.

CLINICAL AND LABORATORY NOTES

ON APPROACHING THE APPENDIX THROUGH A TRANSVERSE INCISION.

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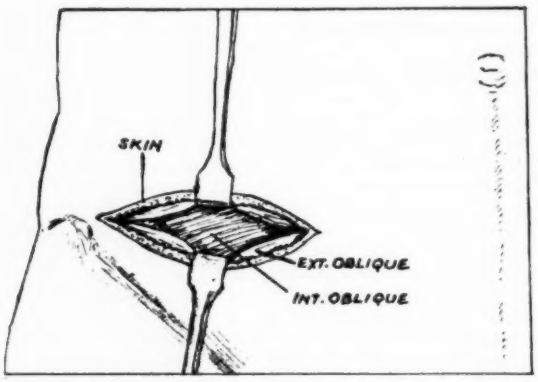
For some years I have employed in certain cases of appendicitis an operative approach which may be worthy of publication. Its originality cannot be vouched for, but it is not described in the standard text-books and I have not encountered it in the somewhat limited research which I have made into the vast literature on the subject.

The approach is equally suitable for acute and chronic cases, and can be employed for the drainage

Fig. 1.



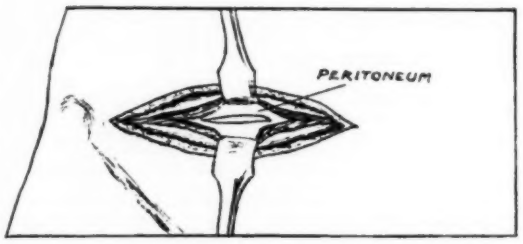
of an iliac abscess as well as for the removal of the appendix. It has, however, one important limitation—i.e., the incision is horizontal and cannot be prolonged to deal with an epigastric or a low pelvic lesion. When the diagnosis of an iliac appendix is reasonably certain, and a general exploration of the abdomen is either unnecessary or undesirable (very frequently the case in these days of improved diagnosis and conservative surgery), this method has very real advantages. It provides an excellent approach, permits of a rapid and easy resection of the appendix, and has proved the simplest and safest route for a retroperitoneal approach and the drainage of an iliac appendix abscess. Other advantages will be pointed out later.

TECHNIQUE.

For appendicitis without abscess.—The incision is absolutely horizontal, and extends from the anterior superior iliac spine inwards for 1½ to 3 inches, according to the age and build of the patient. The external oblique aponeurosis is exposed and a few of its muscle-fibres will be seen at the outer end of the wound. One or two bleeding-points may require ligature. The aponeurosis is split in the line of the skin incision and the muscular fibres of the internal oblique are exposed. These fibres are here running almost transversely and a line of separation is made with a blunt instrument. The transversalis is then split in a similar manner and the transversalis fascia divided in the same direction. One nerve only is likely to be encountered; this is the iliohypogastric, which pierces the internal oblique an inch or so in front of the anterior superior spine and can be readily displaced.

The peritoneum is now exposed, and at the outer angle of the wound this can be seen coming off the

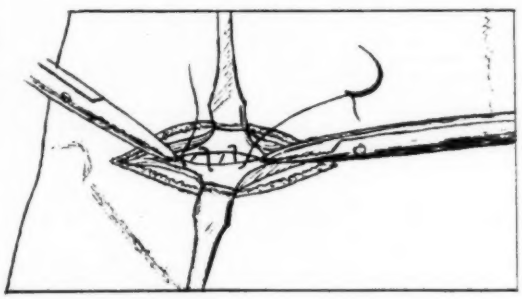
Fig. 2.



iliac fossa to the anterior abdominal wall in the form of a lateral reflection, which stands out as a definite fold. It is picked up and incised horizontally, a 1½-inch opening usually being sufficient. The cæcum will be found immediately under the wound and can be delivered very easily, except when anchored by adhesions. An adherent subcæcal, retrocæcal, retrocolic, or ileal appendix can be freed and brought out with greater ease than through the more medial oblique or vertical incisions in common use. These four positions between them account for no less than 68 per cent. of 5000 cases investigated by Wakeley and Gladstone.[1] Real difficulty has only been encountered in appendices bound down in the pelvis, and even here the procedure can be greatly facilitated by prolonging the incision inwards for half an inch or an inch.

After the appendix has been amputated and the stump invaginated, the edges of the peritoneum can

Fig. 3.



be picked up with great ease and brought together with a suture. I frequently employ a single running suture puckering the peritoneum, one knot being sufficient. The muscle-fibres are approximated with one mattress suture, the aponeurosis sewn up, and the skin wound closed, preferably with a subcuticular suture.

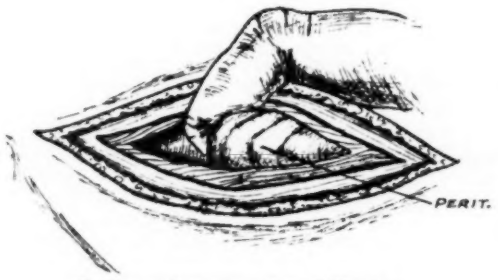
For iliac appendix abscess.—In the presence of a localised abscess, shut off from the general peritoneal

[1] The Lancet, 1928, i., 178.

cavity, modern teaching favours conservative methods. The immediate indication is to open and drain the abscess, and only to remove the appendix when this can be done without danger of infecting the peritoneum. Appendicectomy can be performed in other cases at a later date, with incomparably greater safety. A pelvic abscess should be opened through the rectum, but in the case of an iliac abscess the ordinary transperitoneal approach must be condemned, as it entails a definite risk of peritoneal infection.

My approach provides a safe route for the evacuation and drainage of an iliac abscess, as the entire procedure can be carried out extraperitoneally. The incision need only extend for 1½ to 2 inches inwards from the anterior superior spine. After the aponeurosis has been divided and the muscles

FIG. 4.



Perit. = peritoneum peeled off iliac fossa.

split, the reflection of peritoneum coming off the iliac fossa is sought and peeled inwards off the iliacus until the abscess can be felt from behind. It is then opened with the finger or with sinus forceps and cleaned out with swabs on holders. A drainage-tube is inserted into the abscess cavity and brought out through the outer end of the wound. With the patient lying a little over on the right side very excellent drainage is provided. In this way all danger of soiling the peritoneum is avoided, and in every case in which this technique was followed the result was satisfactory, the abscess clearing up and the wound usually healing in less than half the time required for the healing of an abscess opened transperitoneally.

ADVANTAGES.

(1) This method provides the easiest possible approach to the cæcum and therefore to the appendix, when this is not bound down in the pelvis. With the incisions in common use several minutes may be spent in pulling out coils of ileum before finding the cæcum. (2) It causes less damage to the abdominal wall, as no nerves get in the way, and the muscles are split in the direction of their fibres. As a result, the danger of ventral hernia is greatly reduced. (3) It has this great advantage over the grid-iron incision: all the layers of the abdominal wall are split in the same direction and, therefore, a greatly improved exposure is obtained. (4) The horizontal incision lies in a natural fold; the scar cannot stretch and becomes practically invisible. (5) With a little experience, considerable time is gained over other methods; in uncomplicated cases the operation should be completed in 7 to 10 minutes. (6) Its advantages in the treatment of an iliac abscess are very real and perhaps constitute its greatest recommendation.

To sum up, this approach is confidently recommended as worthy of trial in cases in which the diagnosis of an iliac appendix is clinically certain, and particularly when an iliac abscess is suspected. I have employed it in over 200 cases, and in only five of these was it necessary to make a fresh incision to deal with some other abdominal or pelvic lesion.

TWO UNUSUAL CASES OF SUICIDE.

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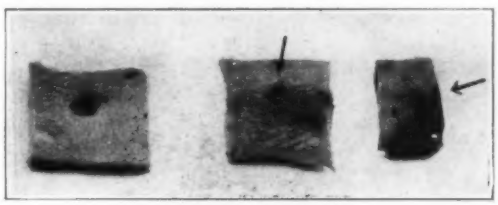
TWO GUNSHOT WOUNDS IN THE HEAD.

Two brothers were in partnership as dairymen. On the morning of the occurrence both brothers got out of bed at the same time, about 6 A.M. One went out to bring in some cattle, while the other (the deceased) went about the household duties he usually performed. The one who had gone out returned within half an hour to find his brother lying unconscious in the back kitchen. He noticed some hæmorrhage from the forehead. He summoned assistance, and while attending to his brother found a rifle underneath his body. The doctor who was called in washed and bound up the wounds and sent him into hospital, where he died some three hours later without regaining consciousness. The doctor afterwards stated that there was no tattooing from gunpowder around either of the wounds before he had dressed them.

The *post-mortem examination* was performed on the following day. There were two punctured wounds in the

FIGS. 1 2 3



Entry wounds of bullets: 1. Fired into dead skin at distance of three feet. 2. Fired into dead skin at distance of one-tenth inch. 3. Skin from Case 1.

forehead, both measuring in diameter three-sixteenths of an inch. One was situated in the mid-line, two inches above the bridge of the nose, and the other in the upper margin of the right eyebrow in a line with the outer angle of the right eye. There was no burning or scorching around either of the wounds, nor was there any singeing of the eyebrow. The wound in the middle of the forehead penetrated the whole depth of the tissues, and at its base, lying against the bone, was found a flattened bullet. There was no injury to the bone at this point. The other wound, over the right eye, penetrated the skull. The bullet had made its way diagonally across the brain and in a slightly downward direction. It was found in the brain substance at the tip of the left occipital lobe. There was no injury to the base of the skull. There was no organic disease of the brain. The examination of the other internal organs showed only slight tuberculous infection of the apex of the right lung.

On first thoughts this would seem to be a case of homicide. Would it be possible for deceased to have fired both shots? There was no known motive for suicide; the deceased was not embarrassed in any way.

The rifle was a Marlin repeating rifle, calibre 0·22. It had a tube beneath the barrel capable of holding, I think, 15 cartridges. After firing a lever is pushed

down and is then brought back to its original position by closing the hand. This procedure automatically ejects the spent cartridge, cocks the rifle, and reloads. It could also be used as a single-shot rifle, but in any case the lever has to be used. The bullets were "long but short," and the powder smokeless. They were of American type and of old manufacture. If the deceased did fire both shots it was only possible for him to do so at very short range. There were no contrivances for pulling the trigger, and he was wearing his boots.

The classical signs of a near gunshot wound made by similar bullets may be taken to be: (1) burning and singeing round and near the wound, accompanied by some bruising; (2) tattooing due to deposit of unexpended gunpowder. All these were absent in this case, except some slight bruising in the lower border of each wound.

With the assistance of the police some experiments were carried out with the rifle in question, using similar cartridges. With a piece of cardboard there was distinct evidence of tattooing up to a distance of 18 inches. Burning and scorching were difficult to assess owing to the composition of the target. The experiments were repeated, using material from a post-mortem examination, the results being shown in the accompanying photograph. Fig. 1 shows a shot fired at a distance of 3 feet; it shows distinctly irregularity of the edges. Fig. 2 is of a shot fired at as short a distance as was compatible with safety during the experiment, approximately a tenth of an inch. It shows absence of scorching and singeing. Fig. 3 is that of the deceased. Both of the deceased's

FIG. 4.

Radiogram of skull showing bullet in position for 14 years.

wounds had regular edges slightly inverted. In Fig. 3 there are marks which closely resemble tattooing. These were invisible until the specimen had been placed in methylated spirit to restore the colour after fixation. Section of these marks show them to be subepithelial petechial hæmorrhages; there is no destruction of the squamous epithelium. The hæmorrhages were confined to the subcutaneous areolar tissues.

These experiments showed quite clearly that the rifle had been fired at very close range, although practically all the signs of close-range firing were absent. It is probable that of the two shots the one in the middle of the forehead was the first to be fired. One would have thought that the deceased, having received the first shot, would have been too much incapacitated from shock to fire a second shot within such a short interval. That shock is not commonly present in gunshot wounds was shown by the late Sir Frederick Treves from experience gained during the South African War.[1] Numerous cases could be quoted from the late war—for example, the X ray photograph (Fig. 4) showing a bullet lodged in the right temporo-sphenoidal lobe. The recipient received it from Turkish rifle fire near Kut on May 1st, 1916. He states that he had no idea he had been wounded, his only symptom being a slight trickle of blood down his right cheek, and he walked, without assistance, a distance of one and a half miles to a dressing station. The bullet penetrated over the right eyelid in much the same position as in that of the deceased. At present his only symptom is very slight loss of memory. All honour to the surgeon who left the bullet alone!

Although there was no tattooing around the wounds of the deceased, microscopic section showed abundant deposit of unspent gunpowder in the deeper layers of the tissues.

The jury returned a verdict of "Suicide during temporary insanity."

I am indebted to Dr. C. M. Rigby, clinical assistant, Department of Radiology, the Royal Hospital, Wolverhampton, for the preparation of the X ray plate; and to Chief Supt. Heath and Supt. Jeffery, of the Staffordshire Constabulary, for their coöperation, Supt. Jeffery supplying the details of the rifle.

SUICIDE BY BINOXALATE OF POTASH.

A spinster, aged 37, arrived in Wolverhampton about 10 A.M. She was found by the police dead on a seat in one of the town's parks at about 1 P.M. I performed a post-mortem examination two days later.

The body was that of a well-developed female; the features were somewhat distorted and no odour was detected from the mouth or on opening the abdomen. The liver was fairly firm and showed no macroscopic changes. The spleen was soft and friable. There were no signs of corrosion of the mouth; the œsophagus was grey in colour, and there was no destruction of the mucosa. The stomach contained four ounces of a dark-brownish blood-stained material. The internal wall was wrinkled and whitish-grey, and the congested vessels were sharply demarcated from the surrounding tissues as blackish arborescent streaks. In one place there was evidence of a healed ulcer. The small intestine showed similar congestion down to a few inches above the ileo-cæcal valve, the appearances of the vessels being somewhat similar to those of the stomach, although not so pronounced. The mesenteric glands were tuberculous, and some were calcified. Both Fallopian tubes showed tuberculous invasion, and the tip of the appendix was adherent to the right ovary, which was cystic. The uterus showed some endometritis. The heart showed no abnormality. The lungs were congested, and for a radius of about two inches around the hilum the blood was a bright red. The pancreas and the kidneys showed venous engorgement.

Microscopic examination of the latter showed that the glomeruli had almost all escaped damage; in only a few was there a slight hæmorrhage, with no degenerative changes. There was extreme degeneration in the tubules, the collecting tubules being the least affected; there was also considerable interstitial hæmorrhage. The brain was somewhat congested, and showed towards the base a few petechial hæmorrhages.

About fifty yards from the body were found a labelless four-ounce bottle and a small tumbler containing a white crystalline substance, which afterwards proved to be binoxalate of potash. I was able to find grs. 31·34 of this substance in the stomach contents alone. The deceased had previously vomited; the vomit I did not obtain. A solution made from the teeth, which were false, also gave a typical reaction. This was interesting, since one of the reactions is a white precipitate with silver nitrate and the normal contents of the stomach also give this white precipitate. On allowing the filtered gastric contents to crystallise out, only a few rhombic prisms were obtained, the majority assuming the plumose shape.

I am indebted to Dr. S. C. Dyke, consulting pathologist to the Royal Hospital, for permission to record these cases.

[1] Vide Glaister's Medical Jurisprudence, 4th ed., p. 296.

MEDICAL SOCIETIES

CHELSEA CLINICAL SOCIETY.

Dr. F. J. McCANN took the chair at a dinner meeting of this Society held at the Rembrandt Rooms on Dec. 16th, when a discussion on

Fibrositis

was opened by Sir THOMAS HORDER.

The treatment of all fibrositic conditions, he said, from the simple attack of lumbago to the many involved and obscure forms now recognised, depended largely on a correct appreciation of the numerous ætiological factors involved. The chief of these were: (1) microbic infection, which had hardly been mentioned 20 years ago and would perhaps be almost forgotten 20 years hence, and which to-day was somewhat overrated; (2) metabolic defects, such as the oxalic and possibly the phosphatic diathesis; (3) defective nutrition, including that seen in patients who had been treated by means of ill-conceived dietetic methods; this included the plethoric condition, of which the "city alderman" was an example. The factors outside the physician's control were also important: (4) age, (5) sex, (6) heredity, (7) the menopause, (8) climate, (9) occupation, and (10) trauma.

The view that microbic infection was the dominant factor was so strong to-day that in most text-books the term "rheumatoid arthritis" had been abandoned. Nevertheless, it might not be dominant in any given patient, and in each case it was advisable to ascertain to what extent the microbic infection as a whole contributed to the condition in relation to other factors rather than to perform many different bacteriological tests. A classification according to the importance of the infective factor would be headed by such diseases as gonococcal and meningococcal arthritis, followed by syphilitic diseases of joints, tendon-sheaths and bursæ; dysenteric fibrositis; and, finally, the arthropathies: Charcot's joints and syringomyelic joints; pure traumata leading to small hæmorrhages, and ruptures of synovial fringes leading to synovitis and arthritis.

The difficulty lay in the intermediate group, which included the factor of gout. The gouty patient demonstrated a tendency to metabolic—or purin—dysfunction which was in many instances activated by microbic subinfection. The treatment of this often produced relief, but a gouty patient always had a peculiar clinical picture different from that of other expressions of focal sepsis, and the removal of the infection would not dispose of the metabolic dysfunction. In the rheumatoid state there was usually an infective factor, but it was only one of many; others were lowered nerve tone, which lowered resistance to subinfection, and the nutritional factor.

Since dental sepsis was often closely related to fibrositis, a careful clinical and radiological search should be made for devitalised teeth, gum recession, deep pockets; "throwing-out" of the alveolar margin, indicating a local chronic fibrositic process; and "pyorrhœa sicca," a chronic dry fibrositic process probably induced by apical infection. Dead teeth, obviously infected teeth, and those with apical abscesses were sacrificed in chronic or recurring fibrositis, but where the periodontal membrane was thickened and inflamed with a certain amount of recession of the gum but the teeth were alive and mechanically useful, the patient should be expected to share some of the responsibility of removing them and should be told frankly that the result was doubtful. The septic tonsil was not so likely to be the big hyperplastic one as the small, blue, hard tonsil which, like the gum, gave an impression of being fibrositic—the impression that it had been subjected to a chronic, non-suppurative (the speaker stressed this qualification) inflammatory process. Sepsis was by no means synonymous with suppuration. The sinuses should be examined in the routine manner. The prostate should be suspected if there were any history, not necessarily of gonorrhœa, but one substantiated by prostatic threads or mucus in sedimented urine, whether organisms were present or not. Massage often gave good results. The urine in fibrositic patients rarely showed organisms if collected under sterile conditions. Sir Thomas did not advise speculative removal of the appendix or gall-bladder, but if there were clinical reasons, especially supported by radiological reasons, he gave the benefit of the doubt a little more readily to the fibrositic patient than he would to another.

Fibrositis might in some cases be due to a subinfection of tracts of mucosa rather than of its "bellyouts" or culs-de-sac. It might be profitable to examine the nasopharynx "by the square inch" rather than merely its "dug-outs." Intelligent appreciation of the importance of subinfection of the intestines had been hampered by the introduction of the horrible term "alimentary toxæmia." This might mean any one of a number of conditions, from the absorption of ptomaines or putrefaction products to protein sensitiveness. Microbic infection of the intestinal mucosa was, of course, not a toxæmia in the sense of intoxication; the French recognised the distinction very clearly.

In treatment, apart from acute microbic infections, there was very little indication for the use of bactericidal serum. Vaccines might, however—if the major premise were allowed that the condition was chiefly due to infection—be of value. The pyogenic cocci lent themselves readily to the production of antigens. According to Dr. Warren Crowe, the practitioner was inclined to abandon the treatment too early and to lose heart because the patient became sensitive; this was, according to Dr. Crowe, rather a cause for encouragement. Sir Thomas thought that vaccines were not given as good a trial as they should be in chronic intractible fibrositis. A boom in physical methods of treatment was overdue. It should not be necessary to send patients to the osteopath. Hundreds of milder cases were cured outside the control of the professions because practitioners did not take enough pains, and had not quite the right liaison with trained assistants. For muscles, massage was the most important form of treatment; for joints, passive leading to active movements under the direct supervision of the practitioner. In neuritis or sciatica the physiotherapeutic part of the treatment was the most important. Speaking of drugs, Sir Thomas said that the present age was one in which specificity in treatment and the linking-up of treatment with diagnosis were not popular. Personally, he preferred not to give drugs whose action he did not understand.

DISCUSSION.

Dr. C. E. SUNDELL said that, in the vast majority of cases, the bacterial factor was of no importance.

Why should fibrous tissue suffer from "-itis" and not other tissue? The striking difference was its relative avascularity, and the condition might be based in some circulatory anomaly. The first stage was capillary stasis of the affected parts, and it was then that treatment should be started, before the nodule developed. Heredity was extremely important; fibrositic patients manifested the adult stage of a life-history of which the juvenile stage was growing-pains. The temperature of the patient was always subnormal except under a stimulant—an indication of sluggish metabolism. Anomalies of skin secretion were very frequent; the skin was dry, and profuse sweating could be induced by certain stimuli, resulting sometimes in cure. Subject to the removal of septic foci, treatment was in the hands of the physiotherapeutist, who could stimulate the circulation and the action of the skin. Endocrine trouble might be a factor, and small doses of thyroid were often effective.

Dr. K. E. ECKENSTEIN said that in fibrositis the practitioner was dealing with a patient complaining of vague pains which were nevertheless very definite and difficult to cure. The only thing that he could do was to treat the patient to the best of his ability and hope for a good result.

Mr. P. JENNER VERRALL said that certain types of fibrositis—particularly tennis-elbow and painful heel—were almost always due to focal sepsis, usually an apical abscess. The question was not as vague as some speakers had suggested. The condition was governed by the good old orthopædic principle of circulating toxins, chemical or microbic, and a local trauma, which need not necessarily be an injury but was often a slight chronic irritation. The cure of tennis-elbow by the incision of Osgood's bursa was due to the opening-up of the deeper lymphatics. Patients with lumbago were often lordotic; their posture put a chronic strain on the erector spinæ which fatigued it so that all the strain was thrown on to the fibrous tissue. This was an example of chronic continued trauma, and any kind of circulating toxin was liable to affect that strictly non-vascular tissue, the attacks depending on whether the toxins were in the ascendant or not.

In physiotherapy, the acute case required not osteopathy but sedative massage. In chronic fibrositis a time came when the condition became an infiltration of the fibrous tissue of the fasciæ and possibly of the muscles; manipulation, preferably under an anæsthetic, was then the treatment of election.

Dr. TEMPLE GREY suggested that all children had growing-pains. The soil must be more important than the infection, or people in the lower classes, who often suffered from extreme forms of local sepsis, would suffer more from fibrositis. It might be useful to revise the old doctrine of individual temperament.

Dr. E. P. FURBER suspected that many of the modern remedies acted chiefly by psychotherapeutic means.

The CHAIRMAN said he feared the profession had all gone septic mad. Pyorrhœa was a disease of the gums, not of the teeth, and extraction should not be necessary in its treatment; he advocated salt solution. He remarked on the frequency of fibrositis in the medical profession, especially in surgeons, and inquired whether long hours in the humid atmosphere of the theatre were not to blame. He sought an explanation in the term "tissue indigestion"—congestion of the blood-vessels and lymphatics. This would account for the universality of the disease and its appearance even in animals and birds. He had immensely improved his own condition, of which the basis was undoubtedly hereditary, by rational dieting.

Sir THOMAS HORDER, in reply, said that capillary stasis was possibly one of the expressions of the inflammatory state, and that subnormal temperature and lowered basal metabolic rate showed a chronic infection to which there was a low grade of resistance. There was a trend of opinion in favour of raising resistance rather than combating infection directly. He had, he said, obtained good results from atophan provided that it was carefully given, three days at a time, with rest periods of three days, in conjunction with alkali treatment. He had never met a disaster from its proper use. It was a powerful detoxicator of purin derivatives in the liver.

ROYAL ACADEMY OF MEDICINE IN IRELAND.

SECTION OF PATHOLOGY.

AT a meeting of this Section on Nov. 28th Dr. J. LAIT, the President, took the chair, and a paper on the prevalence of

Diphtheria Carriers among Dublin School-children

was read by Dr. R. A. Q. O'MEARA. He had, he said, taken nose and throat swabs from 1000 school-children between the ages of 3 and 13, and found morphological diphtheria bacilli in 50 (5 per cent.). In 41 (82 per cent.) of the carriers the organisms were isolated and subjected to fermentation and virulence tests. It was found that 2·3 per cent. of the 1000 children were carriers of virulent diphtheria bacilli, and he estimated that there were some 3000 carriers of diphtheria bacilli in the Dublin schools, of whom 1400 carried virulent organisms. The carrier-rate was higher for girls than for boys. The importance of nasal swabs in searching for carriers was shown by the fact that 25 of the positives were nasal carriers only; 18 were throat carriers only, while 7 were carriers in both nose and throat. The organisms were virulent in 44 per cent. of the nasal carriers, in 43 per cent. of the throat carriers, and in 68 per cent. of the nose and throat carriers.

The PRESIDENT asked what the clinician should do when he encountered these children, and how they were to be distinguished from early cases of diphtheria.

Dr. W. R. O'FARRELL referred to the intermittency of the carrier state, and its bearing on the results obtained in any locality.

Dr. M. J. RUSSELL, speaking as medical officer of health for Dublin, said that Dr. O'Meara's results showed a serious state of affairs, especially as the schools of the city were overcrowded. A clinic had been established for prophylactic inoculation of children before school age with toxoid-antitoxin mixture, and it was hoped that the incidence and mortality of the disease, which had shown a distinct upward tendency in recent years, would be lessened. He appealed to clinicians to assist in reducing the figures by prompt isolation of cases and by deferring the discharge of convalescents until they were shown to be free from diphtheria bacilli.

Dr. A. R. PARSONS asked what was the significant difference between virulent and non-virulent diphtheria bacilli, if the presence of the non-virulent bacillus was of any consequence, and if the non-virulent could change into the virulent type.

Dr. W. F. HOOPER suggested that the inculcation of cleanly habits into the poorer children in Dublin schools would help in reducing the number of carriers.

Dr. O'MEARA, in reply, said that the Schick test was a method—not however to be recommended—of distinguishing the carrier from the early case. The distinction could best be made on clinical grounds, and in cases of doubt serum should be given. The difference between virulent and non-virulent diphtheria bacilli was that the former were toxin-producing, whereas the latter were not. The non-virulent type was harmless and did not give rise to the virulent type. There was no necessity for giving antitoxin when only non-virulent organisms were present.

The PRESIDENT read notes on a case of cerebro-spinal fever.

KING EDWARD'S HOSPITAL FUND FOR LONDON.

A MEETING of the President and General Council of King Edward's Hospital Fund for London, for the purpose of awarding grants to hospitals and convalescent homes, for the present year, was held at the House of Lords on Dec. 12th.

The Prince of Wales, who was in the chair, read the following message from the King:—

"Buckingham Palace.

"The King has learned with much satisfaction that the income of the Fund has enabled the distribution to be increased from £250,000 to £266,000, and that £116,000 has also been received on capital account. These gratifying facts themselves testify to the confidence which the Fund has established in the minds of the public, and must be a great encouragement to all its workers and well-wishers.

"His Majesty deeply regrets the death of Sir Otto Beit, to whose munificence the King's Fund is indebted for so large a proportion of the radium which it holds for the use of hospitals in London."

Increase in the Distribution.

Continuing, His Royal Highness said it was very fortunate that it was possible to increase the distribution this year from £250,000 to £266,000. It had remained at the quarter million for two years, and a good step forward had been made towards the £300,000 mark. This increase was made possible by three satisfactory features in the receipts. First, a donation of £10,000 from the anonymous friend who had during the past few years given seven sums, amounting in all to £54,000; secondly, there had been considerable additions to the capital fund, notably £90,000 under the will of the late Lord Revelstoke, for many years the treasurer, and the income from this capital was the solid foundation on which the annual distribution was based; thirdly, the legacies not earmarked for capital had now, for the third year in succession, amounted to more than £60,000, and the whole £60,000 had been received before November, when the estimates were made up. The combined result was that the distribution had been increased by £16,000, and the Fund was able to pay the special grants towards the pensions scheme for nurses and hospital officers, which come to about £16,000, without running any undue risk of not maintaining this progress in the future. The total amount distributed was thus £282,468.

PROGRESS OF THE VOLUNTARY HOSPITALS.

Voluntary hospital managers, like most other people the world over, were finding 1930 a difficult year. But, said his Highness, before we begin to talk about remedies, let us try to get the diagnosis right. There had been no evidence whatever of any gradual drying up of voluntary contributions during recent years. From the figures in the King's Fund Statistical Review down to the end of 1929 it would be seen that the number of beds was larger every year; expenditure, therefore, increased every year, but income more than kept pace; the aggregate surplus on the year's working increased from £17,000 in 1928 to £50,000 in 1929; surpluses were £3000 more, deficits £30,000 less; the total from voluntary gifts for all purposes in 1929 was £2,800,000. This referred to the hospitals in London alone. The figures for hospitals outside London were better still. For years this had been the normal general position of the voluntary hospitals, maintained, like all good things, only by constant effort, but nevertheless successfully maintained. The difficulties at the present time were exceptional. Taking all the hospitals together, during recent years, there had been a steady increase in income year after year.

IMPORTANCE OF THE VOLUNTARY SYSTEM.

It was important that voluntary contributions should be maintained. Efficiency could be secured in many different ways; but there were certain special characteristics with which the voluntary system permeated the whole hospital service of this country; and these characteristics had their origin in the close touch between the workers in the hospital, voluntary and paid, and that particular form of sympathy and public spirit which found expression in voluntary giving.

GROWTH OF THE HOSPITAL SAVING ASSOCIATION.

Voluntary contributions by patients themselves had been growing at a great rate, and he particularly referred to the contributions organised by the Hospital Saving Association, under the chairmanship of Sir Alan Anderson, by means of weekly workshop collections. The membership of the H.S.A. had grown from 62,000 in 1924 to 800,000 in 1930, and the total receipts from £22,000 to £438,000, all collected in threepences. As patron of the association, and as president of the King's Fund, which helped to found it, this information was known to him, but the other night he had seen a hall packed with 2000 men and women, all obviously in a state of enthusiasm over their job of putting up over 3*d*. a week out of their wages, and giving up their spare time to get others to do the same, in order to be able to contribute their fair share of the cost of hospital treatment for themselves and their families, and to help their mates to pay theirs, and thus to help the hospitals to treat those who could not afford to pay. If those wage-earners could thus continue, in ever-increasing numbers, voluntarily to contribute their share, in spite of the bad times, surely it was up to all the other members of the community also to contribute their share, and so make sure of keeping the voluntary spirit of mutual helpfulness as a permanent feature of our hospital service, under the new arrangements for coöperation between the county authorities and those responsible for the voluntary hospitals.

Distribution of Radium: Further Gift from Sir Otto Beit.

Besides the ordinary distribution they had to consider the allocation of the further 6 g. of radium which the Fund was able to buy because of the King's Fund share of the Thank-offering radium money, and the £10,000 from Mr. Roger Parr. This is in addition to the 4 g. bought in 1928 with the gift of the late Sir Otto Beit, whose death was such a grievous loss to all who knew him, and knew and valued the great work which he achieved by devoting so much of his

wealth, and also of his time and thought, to public objects, particularly the advancement of knowledge and the cure of disease. When the Distribution Committee prepared their report, there was a deficit on this additional 6 g. in the neighbourhood of £8000. This deficit no longer existed; for it was one of the last acts of Sir Otto Beit to authorise the honorary secretaries to say that he would himself make up whatever was required to pay for the balance. The King's Fund now held 10 g., and the method of concentrating the ownership of radium in the hands of a central body, which placed it out on loan, was well recognised to be one of the best ways of securing its most efficient use both for treatment and for the spread of knowledge. It was of the utmost importance that the new experience should be pooled, and should be acted on, as quickly as possible. Referring to the Thank-offering Fund, the Prince of Wales said it was interesting to know that the generosity of "Audax" in giving £105,000 to start that Fund was still bearing fruit. Recently an anonymous working man, in consequence of Mr. Audax's broadcasts, had made up his mind to send a guinea a year to the King's Fund for ten years. After sending 18 months' instalments, he had now sent the whole of the balance. Another interesting donation was the grant of £500 from the Naval Benevolent Trust, on behalf of the petty officers, non-commissioned officers, and men of His Majesty's Navy, in appreciation of the work done by the London hospitals for naval men and their dependants.

After referring to the interest of the Distribution Committee in the question of the time at which hospital patients are awakened in the morning, and to the increase in the grant to convalescent homes from £2000 to £3000, and to the Fund's indebtedness to Lord Luke and Lord Macmillan for services in connexion with the Road Traffic Act which ensured some payment to hospitals for the treatment of road accidents, his Royal Highness mentioned the loss to the Fund by the deaths of Sir Francis Champneys, Mr. Pett Ridge, Mr. T. P. Legg, and Mr. W. H. Marshall. He then welcomed back on the Propaganda Committee Mr. E. W. Morris, and concluded by moving a resolution of deep regret at the death of Sir Otto Beit, and the resolution, which contained a message of sympathy in her bereavement to Lady Beit, was passed in silence, the members of the Council rising in their places.

Treasurer's Statement.

Mr. E. R. Peacock (the treasurer) said that the anonymous donation of £10,000 was a most important addition to the income of 1930. The maintenance of the distribution had for many years depended on receiving one or more large donations, and every year one or two had been received, except in 1929, when there were, of course, large receipts through the Thank-offering Fund. The additions to the capital fund during 1930 amounted to £116,000. This included the legacy of £100,000 from the late Lord Revelstoke, which was reduced to £90,000 by taxation. This he regarded as one of the worst and least defensible forms of taxation. There were two other legacies of about £5000 each, one from the estate of the late Sir Frederick Eckstein and one from that of Mrs. Hames—an instalment of a much larger amount. There was also £15,000 from "Audax." It was indeed satisfactory that legacies available for general purposes should, for the third year in succession, have come to more than £60,000. Taking all these receipts into account, the Fund had been able not only to increase the ordinary distribution by £16,000, but also to meet the cost of the special grants in aid of expenditure on the Pensions Scheme, which came to just over £16,000, and to carry nearly £16,000 to reserve, where it would be available for use in case of future emergency. As the hospitals had for some time past added every year approximately 500 to the number of their beds, it was clear that to keep pace with the needs of the hospitals there must be a progressive and substantial increase in the amount of the annual distribution.

Lord Marshall, in making the annual statement on behalf of the League of Mercy, said that this year the League of Mercy proposed to allocate to the King's Fund the sum of £17,000 from its collections.

Grants to Hospitals and Convalescent Homes.

Sir Cooper Perry (the chairman of the Distribution Committee) presented the report of the Committee on the Distribution to Hospitals (including Recovery and Convalescent Branches), and moved the recommendation that the grants be approved.

The report stated that the amount placed at their disposal for allocation amongst hospitals and their recovery and convalescent branches was £263,000, as against £248,000 last year. The number of hospitals applying for grants was 141, as against 143 in 1929. The Ross Institute and Hospital for Tropical Diseases had withdrawn its application, and the Middlesex Hospital now applied in respect of the main hospital and the cancer wing as a single institution. As the General Council had increased the total to £263,000, the Committee had been provided with an additional £9000, corresponding to the amount added to the maintenance grants last year, and an additional £6000 to meet increased needs. The special grants towards expenditure on the Federated Superannuation Scheme for Nurses and Hospital Officers came to £16,468, as against £13,734 in 1929. By October, 1930, 97 hospitals had joined the scheme, as against 94 a year earlier; and more nurses and officers had joined.

The total of the present distribution, taking into account ordinary maintenance grants, grants towards capital expenditure, and special pensions grants, was £279,468, which did not include the allocation of approximately £60,000 worth of radium.

Sir Leonard Cohen (hon. secretary) having presented the list of awards the Rev. Owen S. Watkins seconded the motion, which was carried unanimously. Sir Cooper Perry then presented the report of the Committee on the Distribution to Convalescent Homes not attached to particular hospitals, and moved that the grants be approved.

This report stated that the president and General Council had this year fixed the sum available for distribution amongst convalescent homes not attached to any particular hospital in London at £3000, being an increase of £1000 over the amount of the annual distribution in recent years. The number of applications eligible for consideration amounted to 57, as compared with 53 last year.

Lord Luke (hon. secretary) presented the list of awards, and the motion, having been seconded by Sir James Kingston Fowler, was carried unanimously.

Second Allocation of Radium.

Sir Cooper Perry presented a report of the Committee on the second allocation of King's Fund radium to hospitals, and moved its approval. Lady Ampthill seconded, and the recommendation was carried.

The report summarising the present position showed that 10 g. of radium had been allocated among 24 hospitals. In a final paragraph the report stated that it was a source of keen satisfaction that through the generosity of Sir Otto Beit, Mr. Roger Parr, and other donors, the King's Fund should have been associated in the privilege of providing the voluntary hospitals of London with a therapeutic agency of great potency and one which still required wide experience and further research in the best methods of its application.

Arrangements for 1931.

His Royal Highness then detailed the arrangements for 1931, and expressed his regret at the retirement from the Council, owing to ill-health, of Mr. W. J. H. Whittall, who more than anyone else was responsible for the Superannuation Scheme for Nurses and Hospital Officers, a scheme which had now been adopted by more than 100 hospitals in London. If we took the whole country, the figures were 300 institutions; a result on which Sir Edward Penton, the chairman, must be congratulated, as well as Mr. Whittall. Sir James Kingston Fowler, who was unable to accept reappointment on the Hospital Economy Committee, would remain on the Council. His Royal Highness said he proposed to appoint two new members of the Council, Mr. Ernest Pooley and Wing-Commander Louis Greig; and to appoint Mr. Samuel, who was already on the Council and the Propaganda Committee, a member of the Revenue Committee. Major Ian Hay Beith was joining the Propaganda Committee in place of Mr. Pett Ridge.

The Lord Chancellor, the Speaker of the House of Commons, and the Governor of the Bank of England had again consented to act in his capacity as President when he went abroad in January next.

On the motion of the Earl of Donoughmore (chairman of the Management Committee), seconded by Dr. H. Morley Fletcher, resolutions were approved delegating powers to the various committees for 1931.

The proceedings closed with a vote of thanks to His Royal Highness, proposed by Major R. I. Tasker and seconded by Sir Walter Lawrence.

REVIEWS AND NOTICES OF BOOKS

Social Control of the Mentally Deficient.

By STANLEY POWELL DAVIES, Ph.D., State Charities Organisation, New York. With Foreword by FRANKWOOD E. WILLIAMS, M.D. London: Constable and Co. 1930. Pp. 389. 13*s*.

SINCE the publication of the Report of the Mental Deficiency Committee the social problem of feeble-mindedness has probably attracted more attention in this country than ever before. The issue of this book is therefore timely. The author has assembled with much literary skill a large accumulation of facts and figures relating to mental deficiency, and has woven them together into a most readable and instructive account of the evolutions which public opinion has undergone towards this subject in the last 50 years. With the beginning of the twentieth century, two events took place which lifted public opinion out of the apathy with which it had up till this time treated the question. These events were the development and application of the Binet-Simon method of testing intelligence, and the development of the eugenics movement, together with the discovery of the Mendelian laws of heredity. These events initiated what the author calls the period of "Eugenic Alarms." Pedigrees such as those of the Jukes, Kallikak and Nam families worked out by Goddard and Estabrook, and the studies of the Hill Folk, the "Pineys," the Dwellers in the Vale of Siddem by other writers all pointed to the conclusion that mental defect was inherited in substantial accordance with simple Mendelian formulæ. There followed the period of the social indictment of the mentally deficient. Practically all forms of antisocial behaviour came to be attributed to the causal factor of feeble-mindedness, and the logical conclusion emerged that the only effective way of dealing with the problem was to segregate persons thus afflicted for their whole lifetimes. Every feeble-minded person was regarded as a potential criminal. The author vividly describes how this policy of wholesale segregation was found to be unworkable and unnecessary. Financial considerations made it unworkable, while it was rendered unnecessary by the distinction which was seen to exist between the comparatively small group of defective delinquents, of whom the generalisation that they were all potentially criminal emphatically held, and the much larger group of defectives who, by proper training and care, could be educated to lead innocent and useful lives. These historical considerations are very clearly set forth in the first half of Dr. Davies's book. The last half is devoted to a description of the modern colony system for defectives, wherein the process of inculcating social habits and aptitudes is carried out, and whereby the subject is equipped to the best of his limited abilities to lead a happy and useful life in the general community.

The author has gone into his subject with a thoroughness that typifies the best American writings on social science, and he has produced a book which will be read with interest and profit by a much wider circle than that of the medical profession. Appearing at a time when the eugenic aspects of the mental deficiency problem are capable of being stressed at the expense of its administrative aspects, this book is especially opportune.

Hygiene.

A College Text-book for Non-Medical Students. By R. C. WHITMAN, A.B., M.D., Professor of Bacteriology and Lecturer in Hygiene, University of Colorado. London: Chapman and Hall, Ltd. 1930. Pp. 327. 12*s*. 6*d*.

Personal and Community Health.

Third edition. By CLAIR ELSMERE TURNER, M.A., Dr.P.H., Professor of Biology and Public Health in the Massachusetts Institute of Technology. London: Henry Kimpton. 1930. Pp. 443. 12*s*. 6*d*.

"HYGIENE" is intended for the use of non-medical students though medical students also will get much benefit from reading it. In the preface the author mentions that some of those who have read the manuscript have suggested that he uses too many technical and purely medical terms, but he rightly answers that those who intend to study hygiene must be prepared to extend their vocabulary before they can understand the new ideas which it is the object of their study to appreciate. Like many recent

American text-books this work exhibits a refreshing departure from the usual order of the subject matter. Realising that there must be some basis of scientific knowledge, however elementary, before it is possible to understand the meaning of hygiene and its purposes, the author devotes the earlier chapters to such problems as the physical and chemical basis of life and death and the nature of disease and heredity. For a book of this kind the presentation of the problems of inheritance and mendelism is exceptionally detailed. The author wisely omits details about the organisation and work of health departments with which so many semi-popular American books have dealt, and the topic of venereal diseases and sex hygiene are so fully covered by separate works that he has found it practicable to omit reference to them also. Otherwise the book is very complete and well arranged. Yet it must have the defects inherent to the dogmatic presentation of scientific questions, and here and there facts are mis-stated or placed out of their true perspective; but it should prove useful to lay persons studying for qualifications in hygiene, especially to school teachers, health visitors, and to those sanitary inspectors who have a sufficient foundation of general education to derive benefit from it. Indeed, members of the medical profession will find material in it which, while not readily accessible in medical literature, has a definite bearing upon the practice of preventive medicine.

Prof. Turner considers public health from the standpoint of what the college or professional man, who is not a sanitarian, needs to know in order to protect his family and meet his responsibility as a citizen. For this purpose his book supplies a substantial body of information presented in 18 chapters and two large appendices. In this edition much material has been omitted and new sections have been introduced. The book has many good features; it is well illustrated, the language is simple, and the bibliography is extensive. Most of the work, however, is of more direct interest to American than British readers and many statements made would hardly survive scientific investigation. We doubt whether it is wise to attempt to convey to non-medical readers so much information on a subject which depends for its understanding upon a sound knowledge of the natural sciences.

Nervous Indigestion.

By WALTER C. ALVAREZ, M.D., Associate Professor of Medicine, University of Minnesota. London: William Heinemann, Ltd. 1930. Pp. 279. 15*s*.

THE subject of this book must interest every general practitioner, for nervous indigestion is a complaint that he is constantly meeting, and it has certainly increased since the war. Dr. Alvarez has succeeded in writing an account of the subject that is both practical and stimulating. The difficulty of interesting and educating medical students in the care of "functional" cases is demonstrated by the general lack of understanding and appreciation often shown to such patients. Dr. Alvarez stresses the important fact that their symptoms are as real and as distressing as are those produced by many, if not all, organic diseases. Insight, tact, patience, sympathy are required in the treatment of nervous indigestion, and Dr. Alvarez in his final chapter quotes many well-chosen passages emphasising this point. The chapters on the taking of a history and on the handling of the nervous patient are admirable. The whole book is written in an amusing style; Dr. Alvarez is plainly sceptical of some current theories, and is no advocate of a "roughage" diet. The daily use of laxatives he strongly condemns, but his warm advocacy of the barbital group of drugs will not meet with general agreement. He makes no mention of valerian. The book deserves to be widely read especially by those whose experience is slight or is limited to hospital practice.

Études radiologiques sur le poumon et le mêdiastin.

By M. DE ABREU, de l'Institut Brésilien des Sciences et de l'Académie de Médecine de Rio. Paris: Masson et Cie. 1930. Pp. 200. Fr.50.

THIS book contains many original ideas. For example, the author stresses the importance of the tone of an X ray shadow from which, in his view, the depth of a lesion can be accurately judged. Taking the shadow of a rib as corresponding to one of 3 c.cm. of water, the corresponding figure for the heart would be 7·5 and the rib and heart superimposed would give tone of 10·5 to the shadow. On this basis the volume of a lesion is calculated as its square surface multiplied by the tone. In the first part of the book the author describes the principles of thoracic radiology and the various forms of pulmonary tuberculosis as seen by X rays, concluding with a summary and useful list of references. The second part is devoted to an account of the mediastinum and describes the normal and abnormal X ray shadows which occur and, of course, vary with the angle from which the radiogram is taken. The third part deals with the radiology of the heart and intrathoracic vascular system, and contains a list of references to work on the X ray examination of the mediastinum. The book contains 79 figures and 42 radiograms, which are very well reproduced, and it should be read by all interested in thoracic radiology.

Laboratory Pediatrics.

By JOHN D. LYTTLE, A.B., M.D., Assistant Clinical Professor of Diseases of Children, College of Physicians and Surgeons, Columbia University, N.Y.; Assistant Attending Physician, Babies' Hospital, Medical Center, New York. Vol. XX. Clinical Pediatrics Series. London: D. Appleton and Co. 1930. Pp. 189. With Vols. XIX. and XXI. 32*s*.

THIS book contains, in a summarised and tabulated form, the chief laboratory findings in children's diseases under the obvious headings.

The charts record the results in individual cases. The series of sugar-tolerance curves in different conditions is of especial interest, as is also the chart showing the seasonal variation of serum calcium. The author expressly disclaims any intention to produce a laboratory manual, and in order to cover the ground in a book of this size brevity has clearly had to be a leading consideration. Space might, however, have been saved in certain places in order to allow expansion elsewhere, for example, illustrations and descriptions of intestinal parasites could have been omitted, since they can readily be found in the appropriate literature.

The book as a whole makes available in a compact form a considerable body of sound information which has not been previously collected in one volume. The material is almost exclusively American, but the conclusions are of general application, and we notice no omissions of importance. It will be found a useful and reliable work of reference.

THE LANCET.

LONDON: SATURDAY, DECEMBER 27, 1930.

A PUBLIC HEALTH CODE.

THE chaotic state of our local government and public health law is a remarkable tribute on the one hand to our national good temper and on the other to the competence of our local government officials. But there is no virtue in mere chaos. Everyone, therefore, will welcome the announcement that the Ministry of Health, having tidied up the poor-law statutes in 1927 and again in 1930, is now going to attack the law of local government and public health. A committee of departmental and other experts, whose names we announced last week, has been appointed to consider the preliminaries of rewriting the existing legislation in orderly form, the heads under which the new law should be grouped, and the amendments deemed desirable for facilitating consolidation and for securing simplicity, uniformity, and conciseness.

The effort is overdue. Even apart from last year's changes, twentieth century local government could not go on indefinitely under nineteenth century statutes. To name but a few Acts which the committee will have to consider, there are the Municipal Corporations Act, of 1882, the charter of the boroughs, the Local Government Act of 1888, which created county councils, and the Act of 1894, which created parish councils. Somewhere in the statute-book, but in no easy place to find, search will reveal the attributes of that elusive but important entity, the county borough, sometimes wearing the clothes of a county council, at other times those of a municipal corporation. Then there are the landmarks of the movement towards fewer and larger local authorities, the Rating and Valuation Act of 1925, and the Local Government Act of last year. The latter, while inventing guardians' committees and public assistance committees, abolished the guardians themselves but preserved, somewhat obscurely, a bundle of clauses as to guardians' qualifications, elections, and term of office, because these otherwise repealed enactments were (by a wicked but convenient stroke of legislation by reference) needed for rural district councillors. Almost every local authority has its statutory peculiarities in matters which often could be standardised and governed by one common code. For instance, the disqualifications for membership have petty variations for which there seems no better justification than the muddle of piecemeal legislation. Diversities in matters like audit may be inevitable but close examination may discover opportunities for simplification. As for the Public Health Acts, they contain masses of irrelevant police provisions. The main public health law is based on an Act of 1875. A text-book writer would have to take account of amendments and extensions under 40 or 50 subsequent statutes. Here, too, there is the added complication of the difference between the general and the local law. Once again the report of the Select Committee on Local Legislation is recommending that a new Public Health Bill be "introduced without delay" in order to save time and money by making universal the powers given by local Acts to individual councils in the past five sessions. The question of raising the general standard of public health by progressive legislation must, however, be kept separate from the question of consolidating the existing enactments. The Health Ministry's new committee is concerned with the mechanics rather than the merits of the law. It would be unfortunate if reformers blocked the sensible and clear re-statement of existing legislation in their desire for substantial advances. That would be a misunderstanding of the limitations of the committee's task. Indeed, as was the case in recent poor-law legislation, it is necessary first to find out and declare the existing law, before fresh reforms can be framed. The new committee will busy itself with no other amendments than those which serve to clear the ground.

When will the committee's labours show tangible results? Some think in three years, others in five. We trust that Lord CHELMSFORD will prove a chairman who can drive a willing team fast enough to falsify these estimates. A period of minority government in Parliament, when the Cabinet cannot make progress with substantial party measures, is the very time for passing Bills of the kind which the new committee will evolve. The committee, we understand, has already met. Its personnel is well chosen. Outside interests are represented while, on the departmental side, there are experienced legal advisers from the Health Ministry and the Home Office and (for this is largely an expert draftsman's task) a strong contingent of present and former Parliamentary Counsel. Probably the work, when complete, will leave ragged edges on other sides of public administration—education, for instance, the law of highways and those subjects with which the Home Office is concerned. Their turn for clarification will come. Meanwhile, is it too much to ask that the proposals for the new local government and public health codes should be available in print next year?

AGRANULOCYTOSIS.

WHEN SCHULTZ,[1] in 1922, described agranulocytosis he believed it to be an entity, probably caused by a specific micro-organism or some other toxic agent. Clinically, the condition he described is characterised by necrotic ulceration of mucous surfaces, usually about the mouth, with pyrexia and extreme prostation. The blood picture is peculiar, including leucopenia with complete or almost complete absence of granular polymorpho-

[1] Schultz, W.: Commun. to Verein für Innere Med. und Kinderhk., July 3rd, 1922.

nuclear cells—neutrophils, eosinophils, and basophils alike. The red cells and platelets, he said, show little or no diminution and there is no departure from normal in bleeding or coagulation times.

Since these observations were published many similar cases have been placed upon record, but no agreement has been reached about ætiology. The search for a causative organism has been fruitless, and the claims of various bacteria isolated from surface lesions and from the blood have none of them been confirmed. In opposition to SCHULTZ various workers have pointed out a close relationship between the blood picture of agranulocytosis and that of other conditions whose ætiology is to some extent understood—notably, certain toxic states. The most important poisons so far implicated belong to the arsenobenzol group of drugs; it remains uncertain whether it is the arsenic or the benzol which is the toxic agent, but in view of the well-known action of pure benzol upon bone-marrow it seems reasonable to blame the latter. Numerous cases of agranulocytosis following arsenobenzol therapy have been placed upon record, and AUBERTIN and LÉVY,[2] while inclined to suspect the benzol radicle, point out that cases have also been recorded after the use of bismuth preparations and in at least one instance of untreated syphilis. They think that syphilis may act as a predisposing cause by damaging the bone-marrow and thus rendering it susceptible to toxic agents, such as bismuth, arsenic, and benzol. SCHULTZ, while freely admitting that the blood picture may be brought about by various poisons, regards all such cases as secondary or associated, to be strictly differentiated from pure agranulocytosis. At the same time, it is almost impossible to dissociate his pure agranulocytosis from numerous other well-recognised conditions. Thus, with the addition of hæmorrhagic manifestations and a diminution of the platelets, the picture, both hæmatological and clinical, becomes that of the "aleukia" of FRANK, and this again may be indistinguishable from acute aplastic anæmia; while without an examination of the bone-marrow both these conditions may be indistinguishable from "aleukæmic leukæmia." Finally, an almost identical picture may appear in the course of chronic trinitrotoluene poisoning. BENHAMOU[3] is strongly of the opinion that agranulocytosis constitutes a syndrome whose actual appearance may be brought about by the action of divers toxic agents, but only if there is an innate susceptibility of the blood-forming system—in other words, a diathesis. Critics may say that the appearance of a "diathesis" in a French survey of such a subject is inevitable, but there is much to be said in favour of BENHAMOU'S view. All hæmatologists from time to time come across bloods with a marked diminution of the polymorphs, usually showing moderate leucopenia with a lymphocyte percentage of anything up to 50. The subjects, as a rule, are females, and may be in perfect health, though they generally have a tendency to contract minor infections. Such people may reasonably be regarded as possessing an agranulocytic diathesis. BENHAMOU points out that even in "pure" agranulocytosis the leucopenia described by SCHULTZ is not necessarily present. Cases have been reported with a white cell count of 10,000 and more, though the cells have always been all, or nearly all, mononuclear. BENHAMOU himself has shown that even in cases with a leucopenia it is possible by the injection of adrenalin—a procedure first recommended by A. G. GIBSON[4]—to raise the white cell count to 10,000 or more, but even so the added cells are all mononuclear.

The differential diagnosis of agranulocytosis has many pitfalls and the condition is probably far commoner than the diagnosed cases indicate. The necrotic and ulcerative lesions about the mouth may lead to a diagnosis of diphtheria, of Vincent's angina, or even of aleukæmic leukæmia. From the first two of these conditions it may readily be distinguished by examination of the blood, but it may be impossible to establish the diagnosis from aleukæmic leukæmia without examining the bone-marrow. The severe toxæmia and pyrexia may lead to a suspicion of typhoid, pneumonia, or some other acute infection, and here the response to adrenalin may give valuable aid. The appearance of bullæ and vesicles either upon mucous surfaces or skin may simulate pemphigus, chicken-pox, or even small-pox, but the leucocytic formula of blood or vesicular fluid should serve to differentiate it from these. Were the blood examined with more frequency in grave ulcerative conditions associated with fever the condition would probably be diagnosed far more often.

A striking peculiarity of the "pure" agranulocytosis is its predilection for the female sex; over 80 per cent. of recorded cases of this type have been in females. This peculiarity does not, however, extend to cases occurring after arsenobenzol treatment—possibly because of the greater employment of such treatment among males. Among the cases following antisyphilitic treatment a few recoveries have been recorded; apart from these the issue has been almost always fatal. A few cases have been reported in which the patient has recovered sufficiently to be discharged as cured, but in several of them there has been recurrence and death within a few months. These cases offer some evidence in favour of belief in the importance of the constitutional factor. Such recorded cases as have survived have been treated by leucocytogenic agents such as turpentine or milk injected intramuscularly. Where a fixation abscess results, recovery—temporary at any rate—may be looked for; but it remains doubtful whether the fixation abscess is really useful except perhaps for prognosis. In most conditions where the system retains enough reactive power to produce a fixation abscess recovery will be the rule. BENHAMOU advocates the injection of adrenalin along with the leucocytogenic agent, and at least it can do no harm.

[2] Aubertin, C., and Lévy, R.: Annales de Méd., 1930, xxvii., 151.

[3] Benhamou, E.: Ibid., p. 165.

[4] Gibson, A. G.: THE LANCET, 1926, ii., 948.

THE FUTURE OF SURGERY.

THIS is an age of prophecy; during the last few years a series of essays on the future of almost everything has appeared in print, and recently more than one eminent surgeon has discussed the future of his art. The latest addition to the goodly fellowship of the prophets is Dr. A. F. HURST, who, in *Guy's Hospital Gazette* for Dec. 13th, considers the future of surgery. This he places in the hands of the general practitioner. More accurate diagnosis, he thinks, will rob the surgeon of a very high proportion of his patients. Dr. HURST, in illustrating his thesis, naturally thinks of disorders of the gastro-intestinal tract. He recalls an occasion 23 years ago when it seemed inconceivable that duodenal ulcer, which at that time had never been diagnosed at Guy's Hospital, could be a real and common condition masquerading as the familiar acid dyspepsia of the medical out-patient department. The treatment underwent a violent revulsion from mist. gent. et sodæ to radical operation, but Dr. HURST still believes—and is certain that surgeons agree with him—that the best treatment lies in some middle way. The possibilities are suggested by the history of gastric ulcer during the last 25 years. The student of to-day, in his opinion, will be able by the time he goes into practice to recognise the earliest symptoms suggesting the presence of an ulcer and to confirm his suspicions with the aid of the radiologist—and possibly also of the biochemist if a test-meal and the search for occult blood in the stools is beyond his own powers. If an ulcer is present he will give the only adequate treatment: rest in bed on a strict diet for four, five, or more weeks until all pain, tenderness, and rigidity have gone, the last trace of occult blood has disappeared from the stools, and there is no longer radiographic evidence of an active ulcer. He will then treat thoroughly all foci of infection in the mouth, throat, and nose, and will instruct the patient in the régime which he must follow for the rest of his life if he is to remain free from symptoms.

Even cancer and gall-stones, Dr. HURST thinks, will trouble the surgeon of the future in very small numbers only. Just as there are bound to be a few cases of perforation of an ulcer in patients who have had such slight symptoms that they have not sought advice, so there will be cases of malignant disease which must be removed. Dr. HURST, however, confidently hopes that the prevention of cancer will be in sight 25 years from now. Here again much depends on the general practitioner, who has first of all to learn that indigestion of any kind or loss of appetite, occurring for the first time in a patient over 40 years of age and not responding to simple treatment within a week, demands further investigation. Cancer, in Dr. HURST'S opinion, never develops in a healthy stomach and the care of the practitioner in preventing and treating ulcer should prevent one-fifth of all cases of carcinoma of the stomach. The remaining four-fifths have achlorhydria or very low acidity, probably due to an antecedent chronic gastritis, which again it is the duty of the practitioner to find and treat. Unfortunately only a few cases of chronic gastritis show direct symptoms, but they usually result from some easily recognised cause such as acute food poisoning and gastric influenza. Even if the patient appears to have recovered completely from these conditions, a test-meal should be given a month or two afterwards and any achlorhydric gastritis revealed should be treated without delay. Most other cases of chronic gastritis, he says, are the result of excessive cigarette-smoking, alcoholic excess—especially on an empty stomach—pyorrhœa, or chronic infections of the tonsils or nasal sinuses. "Medical" cholecystitis is common enough but too rarely diagnosed. Most of the cases are cured by hexamine in doses up to grs. 300 a day given with sufficient alkalis to keep the urine completely alkaline, especially if combined with "drainage" of the gall-bladder by magnesium sulphate given before breakfast. If early cholecystitis be treated in this way the future of gall-bladder surgery should be a blank page.

The only scope which Dr. HURST gives to the surgeon of the future is in tumours of the brain and chest, but he ventures to hope that the work of CUSHING, TUDOR EDWARDS, and MORRISTON DAVIES may lead to earlier diagnosis and an advance comparable to that in abdominal surgery.

MINERVA.

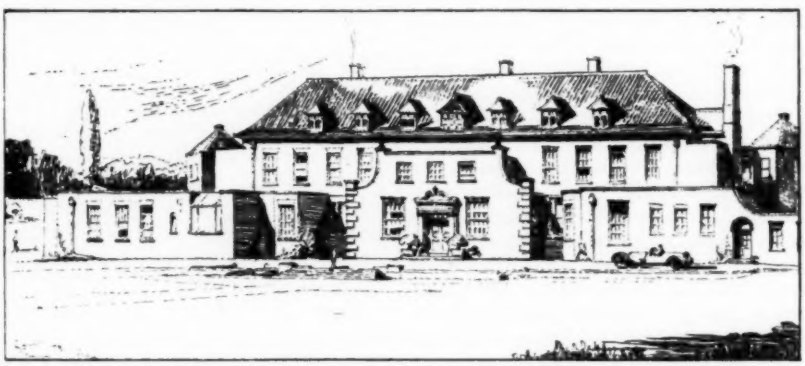
THE thirtieth edition[1] of the Year-book of the Learned World with the well-known title has reached the limit of size. The present edition is 25 sheets larger than the last, although many of the entries have been shortened, and at its present rate of growth the next edition would be at least 20 sheets larger. Dr. Gerhard Lüdtke, who has edited the Year-book since 1905, considers that the limit of price has also been reached, and he hopes to find some different arrangement of the material by which to effect some economy both in cost and size. As a work of reference Minerva is amazing in its inclusiveness and accuracy. Its editor tells of difficulties in getting full details from Japan, with which he is now satisfied, and from Russia, which still leave something to be desired. But even the trained expert seeking to verify something outside his usual works of reference will rarely be disappointed in his search, although in this issue the names of assistant professors in American universities and colleges have been perforce omitted, those of associate professors being retained. It seems to us doubtful if compression or abbreviation could usefully be carried further without making reference less easy, for the list of contractions and symbols already occupies nine columns of the preface, and the office of Regierungsobermedizinalrat is represented by ROMR. The publisher suggests that Minerva would be found useful abroad in all scientific institutions and libraries, as well as to editors and publishers in general. It is our experience that anyone who uses it becomes an addict.

[1] Minerva, Jahrbuch der gelehrten Welt. Thirtieth edition. Berlin and Leipzig: Walter de Gruyter and Co. 1930. Three volumes. Pp. 3546 + 799. M.96.

ANNOTATIONS

THE SCHOOL SANATORIUM.

THE rising walls of the new sanatorium of Epsom College remind us of the part which the sanatorium plays to-day in the administration of a big public school. Sixty years ago few public schools made large and organised provision for dealing with epidemic disease among their charges. There would be accommodation for accidents, and where the separate house system existed the housemaster, and whoever might act as his matron, were prepared to deal with the sick boys in their particular establishments. When the value and even the necessity of a sanatorium or infirmary was perceived all this was changed speedily, and every large public school possesses to-day accommodation for the sick of the school and its environment, the medical officer of the school acting ex officio as the medical director. So far the pattern is common but variations exist alike in the accommodation which is offered at one school and another and in the quality of the service, nor is there any hard-and-fast rule for the number of beds that should be held in readiness in relation to the numbers in the schools. What this percentage should be is not easy to decide; the ratio of 15 per cent. is usually accepted as the right one, but a case could be made out for a larger or for a smaller ratio. A large number of factors must be reviewed. The public schoolboy nowadays has often led such a protected life at home and at a preparatory school that his five years at a public school may be the period in which he will be attacked by what used to be regarded as the inevitable exanthemata. In such a susceptible community one case introduced from without may produce many cases within; in other words, the number of beds available must have some relation to sudden emergency. Whatever the number of such beds may be in proportion to the number of boys in the school, there must also be beds somewhere for the case that requires watching. These patients if isolated early may be found to be sources of danger, and their prompt segregation will prevent any large call being made upon the general accommodation of the sanatorium. The watching can be to some extent carried on in the boarding houses, but that implies spare rooms of adequate character in those houses. The two different methods of attempting early interference in the possible presence of an epidemic accounts for some of the discrepancies which we may find in the size of the various sanatoriums in relation to the numbers totalled by the schoolboys and those in immediate relation to them—the latter being often within a third in size of the numbers in the school.



Epsom College Sanatorium from the north-west.

Yet another reason exists for a generous supply of beds. The medical officer must have an opportunity of isolating the contacts, and that accommodation should be available during the holidays as well as during the term time, for sickness may break out inconveniently near the end of the term, when the public danger is now perceived of distributing a large number of lads to different parts of the country with the seeds of infectious disease already sown. With, no doubt, certain of these reflections in mind the sanatorium in building at Epsom is large in proportion to the size of the school. But here two other arguments obviously exist for the erection of a large institution. First, the school is rapidly growing in response to its recognised position as one of the great public schools of the country; while, secondly, through its foundation it has so close a connexion with the medical profession that a falling off from a high medical standard would be discreditable.

FINALITY IN CRIMINAL TRIALS.

IN 1927 a man was tried at Edinburgh on the charge of having murdered his mother, and the jury, by a majority verdict, found the charge "not proven." This result was correctly stated in our recent review of the volume containing the account of the case in the Notable British Trials series. The reviewer, in venturing the comment that it was perhaps a little hard on the accused that so recent a case should be so soon re-tried on paper, spoke of him as a man "recently *acquitted* of murder"—a description technically incorrect when applied to a case resulting in a verdict of "not proven." A friendly critic, who will sympathise with the Englishman's difficulty in appreciating the niceties of Scottish procedure, points out that the verdict of "not proven" is strictly not an acquittal; it permits of a re-trial, should new evidence at any time arise. If there were any question of a re-trial on the murder charge, the reviewer's criticism (that the editorial introduction to the report of the trial conveys a strong opinion upon the causes of the death) would, according to English notions, be equally valid. Meanwhile, the distinction between the English and Scottish forms of criminal procedure is worth noting. In England (in the absence of any element of insanity) the verdict is either "guilty" or "not guilty"—in other words, either a conviction or an acquittal. And, as it is an established principle of English law that a man may not be put twice in peril for the same offence, he can successfully plead (in the old law-French phrase) "autrefois convict"

or "autrefois acquit," if he is tried again upon that identical charge. The only form of re-trial in such circumstances in England is where the jury has disagreed. It is surprising how seldom this happens when the requirement of unanimity is borne in mind. A disagreement means no verdict at all; the case then comes on again, usually at the next assizes. On the whole it is unlikely that an English jury will find a man "guilty" after the previous disagreement of another jury. Indeed, if two juries disagree and the case comes before a third jury, it is usual for the prosecution to offer no evidence—which means that the accused gets his acquittal at last. It may also be noted that the Court of Criminal Appeal has no power to order a re-trial in England. The functions of the court in ordinary cases are three: (1) on an appeal against conviction, it can allow the appeal, if it thinks that the jury's verdict is unreasonable or not supported by the evidence, or that the judgment was brought about by a wrong decision of a point of law, or that there was a miscarriage of justice—in any other case it must dismiss the appeal; (2) if it allows an appeal against conviction, it must quash the conviction and direct a verdict of acquittal to be entered; (3) on an appeal against sentence it can substitute a sentence either more or less severe. Many critics think that, where an appeal against conviction has succeeded on some technical ground, the court should have power to order a re-trial; but Parliament does not allow this course. When the Criminal Appeal (Scotland) Act of 1926 set up a similar system of criminal appeal in Scotland, the power to order a re-trial was still withheld. But the Scottish Court, dealing with criminal appeals, has here one power which the English Court does not possess. On an appeal against conviction the court in Scotland is empowered not only to quash the conviction but also to quash the sentence passed and to pass another sentence as if the appeal had been an appeal against sentence and not against conviction. Such are some of the minor differences between English and Scottish criminal law, in addition to the much wider distinctions arising from variations in the legal system, the arrangement of courts, and the statutes applicable to the two countries. In England, of course, there would have been a prompt investigation by the coroner; sworn evidence would thus have been available at a very early stage.

THE NERVOUS TEMPERAMENT.

No part of medical practice more persistently eludes any scientific classification than that dealing with the temperamental variations of individuals and their different reactions to stress and strain. A host of vague generalisations, hazy conceptions, and unadmitted ignorance has been concealed under the term "nervous" and its many alternatives. Dr. Millais Culpin and Miss May Smith, D.Sc., working for the Industrial Health Research Board, have attempted to break the ground around this difficult problem and, although they say that their work is no more than disturbing the surface of this important field, yet their results are of the greatest interest.[1] Over 1000 people of both sexes have been interviewed while actually at work, and the authors think that it is possible as the result of a single interview to elicit nervous symptoms or tendencies and classify individuals according to the amount and severity of the symptoms. When the classification had been made, it was found to agree with independent judgments as to efficiency and capacity for adaptation, and with the results of the dotting test. A curious feature of this test is that obsessional subjects are peculiarly good at it. When the nature of the obsessional temperament is considered, this is less surprising than it seems at first sight, but it should prove a useful aid to diagnosis. As has already been shown by other observers, nervous illnesses depend upon occupational conditions as well as upon predisposition, and a "bad" subject may carry on contented and excellent work under good conditions of employment but break down completely if circumstances become difficult.

The applications of this research to industry are obviously of the first importance. In the first place the heavy absenteeism in some firms from sickness labelled "nervous breakdown" or one of its equivalents could be almost entirely prevented by selection of candidates and sensible attention to conditions of employment. Secondly, there is the choice of supervisors who can undertake the responsibility of direction without undue strain and who are able to oversee the work of others without getting on the nerves of everybody under them. Thirdly, there is the problem, known to all industrial concerns, of the erratic worker who oscillates between very good and very bad work for no apparent cause. Last, but not least in importance, is the question of alleviating the disproportionate suffering of some individuals under conditions of noise, stuffiness, or other unpleasantness which do not worry their neighbours in the least. The findings of the investigators cannot conveniently be summarised, but "nervous" symptoms were found in a very high proportion of employees examined—sometimes as many as 50 per cent. Men and women in authority suffered less than lower grades, promotion apparently acting as a form of selection in this respect. The student group had a higher percentage than the factory group, and women dramatic art students showed a very high percentage of the obsessional type. Finally there was evidence of correlation between the results of the experiments and stigmata of discomfort, such as inability to bear noise and dissatisfaction with work and environment.

[1] Indust. Health Res. Bd., Report No. 61. H.M. Stationery Office. 1930. Pp. 46. 1s.

SUN-BATHING IN A LONDON PARK.

Dr. George Sowden, medical officer of health for St. Pancras, reporting upon a sun-bathing centre in Regent's Park which was opened in August, states that the building is of brick, one-storey high, and measures 30 feet in length by 20 feet in depth. It is divided by folding doors, and each half contains sanitary accommodation and a shower bath. The Sunlight League undertook to provide the salary of a competent supervisor from the date of opening until the end of September, and the centre was open daily from 10 A.M. to 1 P.M. and from 2 to 6 P.M. The children admitted were between the ages of 2 and 5 years. They were not suffering from any definite illness, but were selected from those attending the various welfare centres in the borough as being likely to derive benefit from this form of treatment. The parents were required to sign a form accepting all responsibility in connexion with the child's attendance and were asked to provide a towel, bathing slip, and a sun hat. The children were arranged in groups according to their susceptibility to sunlight; each child was weighed at the first attendance and subsequently once a week. During the brief heat wave in the last week of August and the first few days of

September, the attendance was very good, but it fell off during the remainder of the period when the weather was extremely unsatisfactory. The total number of children entered on the register during the seven weeks the centre was open was 148, and the number of attendances each week was as follows: 44, 90, 293, 249, 152, 112, 86, making a total of 1026. It is difficult, Dr. Sowden says, to express an opinion about the effect on the health of the children. In 33 who made 10 or more attendances, there was an increase of weight in 30, varying from ½ lb. to 2¼ lb. The greatest increase was recorded in the case of two children (brothers), who made the highest number of attendances—namely, 29—and whose weight increased by 2 lb. 2 oz. and 2 lb. 4 oz., respectively, a rate of increase much in excess of the normal. In a few cases, children of a nervous, excitable type, who usually slept badly, were stated to be less restless and to be sleeping better. Some improvement in appetite was also recorded. The general conclusion drawn from the experience gained is that it would be difficult and expensive to maintain a centre exclusively for sun-bathing. During bad weather, although the staff would be in attendance, the number of children would be small or even nil. Dr. Sowden is of the opinion that it would be preferable to combine a sun-bathing centre with a day nursery or nursery school.

EXPERT EVIDENCE ON GUNSHOT WOUNDS.

THE life of a person accused of murder often depends on the expert evidence of the toxicologist but equally often on expert evidence about firearms and gunshot wounds. Frequently a medical man is called upon to give this evidence, although a study of the subject forms no part of the training even of an expert pathologist. We publish on another page an account by Dr. W. Stewart of a case in which his careful experiments and evidence extricated an innocent man from a convincing net of circumstantial evidence. In the *Analyst* for December Mr. G. W. Baker describes an investigation he was called upon to make in Jaffa, and which brought a guilty man to justice. This case is of great interest, as it is the first occasion on which X rays have been used in the examination of bullets for forensic purposes. The nose of a bullet was found in one of the bodies of a murdered family, and its peculiar nose-filling of lead and fibre was readily detected by radiology without mutilating the exhibit. A comparison with 32 different makes of ammunition of the same calibre helped to establish the fact that it was from British ammunition as used by the police. Among the empty cartridge cases found about the room was one which lay in a pool of clotted blood in such a way as to show that the blood had flowed round it and that it had not been dropped some time after the crime. This case was brightly polished—a fact which first threw suspicion on the police. Cartridge cases from the accused's rifle had three characteristic features in common with each other and with this exhibit. The first was a bulge on the side of the case diametrically opposite the extractor mark. It was found, however, that the degree of bulge might vary with the same rifle, and that if it were present at all in a rifle it always bore the same relation to the extractor mark. The second feature was an extractor mark characterised by a series of deep cuts with rounded ends parallel with the rim, and at right angles to these a series of long scratches produced on extraction. There were considerable variations in the extractor marks on different cases fired from the suspected rifle, but in Mr. Baker's opinion there was sufficient evidence to identify the rifle. The third feature was a characteristic pattern of at least 14 marks at the bottom of the pin impression in the cap of the cartridge case; the general shape of the impressions was found to be sufficient to identify each of the rifles tested. Moreover, the pin impression could only be produced by the act of firing and not by practice loading and unloading. It was a delicate matter to obtain photographs of these impressions. They were taken through a one-inch objective and the stage of the microscope was removed so that the case could be held vertically and slowly rotated in a slanting beam of light. The equipment used in these investigations included a comparator eyepiece, a camera lucida, and a micrometer eyepiece. To obtain bullets from firing tests in a fit state for comparison, Mr. Baker used a special box divided into six equal compartments by removable cardboard partitions. The first two were filled with cotton waste and the others with fine bran; at about four yards' range the bullets came to rest in the fourth or fifth compartments with little distortion.

As Mr. G. H. Perry, chemist at the War Department, said in a discussion after Mr. Baker's paper, it has become possible in the last few years to identify conclusively cartridge components with the weapon used. Complicated and delicate instruments are required, and the greatest possible care should be taken of the exhibits to avoid any damage or distortion. Modern work on firearms is as refined as finger-print detection. It needs an expert for its execution, but all medical men ought to be acquainted with its possibilities, as it is the doctor to whom appeal will first be made for expert evidence and who very often has the first opportunity of preserving important exhibits.

TREATMENT OF CUTANEOUS TUBERCULIDES.

SUBCUTANEOUS and intramuscular injection of cod-liver oil and its derivatives has been employed for more than a decade as an auxiliary treatment in tuberculous affections of the skin, bones, and connective tissues. In the condition known as lupus pernio, for example, the subcutaneous injection of 5–10 minims of sodium morrhuate has been found satisfactory, and on occasion has even brought about a cure. Jaczewski's use of iodo-morrhuate[1] is an outcome of these tentative methods and has been modified by O. Blatt,[2] who recommends a solution of 1 part of tincture of iodine in 20 parts of cod-liver oil, 5 c.cm. being given by intramuscular injection every 14 days. He does not give iodine by the mouth, as advocated by Jaczewski, and substitutes topical applications of cod-liver oil for iodine paintings of the local lesions. The theoretical considerations which underlie the treatment are interesting but highly speculative. They concern the respective rôles of the fat and lipase metabolism in infected persons, and their reactive potentialities in the biology of Koch's bacillus. Blatt lays stress on the almost specific action of cod-liver oil as compared with other oils (e.g., olive oil), and suggests that its advantage may be a function of the vitamin content. For this reason the cod-liver oil injected is not previously sterilised by heat, all danger of sepsis being precluded by the 5 per cent. iodine in the mixture, which is said also to elicit a more potent and protracted local reaction with the production of lympho-

[1] Przegl. dermat., 1928, No. 3.
[2] Dermat. Woch., 1930, xc., 741.

cytosis. Five to ten intramuscular injections of 5 c.cm. at fortnightly intervals represent the average dosage for adults. In most of them—and with consistent regularity in lupus—fever began to develop on the sixth day. Its maximum was usually on the ninth, and thereafter the temperature fell to normal by lysis, rarely by crisis, in a few days. The reaction, Blatt says, appears to be an essential feature of the treatment and proceeds pari passu with local swelling, hyperæmia, and pain at the site of the injection. In not a few cases a focal reaction was noted in the lupus lesions, which for the time being were distinctly aggravated. The end-results were, however, definite and encouraging; "the patients' general condition was improved, tuberculous ulcers and sinuses after operations healed promptly, and recurrences were rarely observed." Blatt confirms the statement that "lupus vulgaris can be completely cured by this procedure alone." Though he does not give details or results in tabular form, he states that 120 cases of lupus vulgaris, two of tuberculous verrucosa cutis, six of disseminated papulonecrotic tuberculides, and five of erythema induratum of Bazin responded favourably. In five cases of lupus erythematosus in which the evidence suggested a tuberculous ætiology, the method completely failed to give relief. Blatt's conclusions are: (1) that Jaczewski's injections afford a rapid and certain cure of the ulcerative types of tuberculosis cutis; (2) that they may be regarded as the method of choice in the treatment of all types of tuberculide; and (3) that in the treatment of lupus vulgaris the method is a valuable auxiliary to local measures.

THE DENTISTS REGISTRATION FEE.

COMPLAINTS have been heard from dentists that they have to pay a substantial fee annually for their entitlement to practise, whereas a single fee ensures their medical colleagues a place on the Medical Register. A memorandum issued by the Registrar of the Dental Board and printed as an appendix to its minutes sets out the official reply to this and certain other prevalent misconceptions. The Dentists Act of 1921 laid down as a return for the right to practise dentistry given to registered persons that a fee should be charged each year for retention of the name on the Dentists Register. This fee is akin to the payment made annually by solicitors and auctioneers. The Act laid down that it was not to exceed £5; at the present time it is £4. Solicitors in London have to pay £9 and in the country £7 for their annual practising certificate. The fee might have been made payable to the State through the post office or some other agency, but it was made payable to the Board and the Act laid down that, after covering the expenses of the Board, the money should be allocated to purposes connected with dental education and research. Thus while the primary function of the Dental Board is to protect the public by keeping a Register on which is entered the names of all properly qualified persons who desire to practise dentistry, and by removing therefrom the names of persons in whose personal conduct the public can no longer have confidence, the secondary function of the Board is to collect the fee prescribed in exchange for the granting of the right to practise, and to expend moneys so received, and not reserved for their primary purpose, upon "dental education and research or any other public purposes connected with the profession of dentistry." The memorandum insists that the Board was established for the benefit of the public and not for the benefit of the dental profession. It is in no sense a professional protection society, and dentists who desire to combine to further their own interests must become members of some society of their own for that purpose, such as the British Dental Association, the Incorporated Dental Society, or the Public Dental Service Association. The Board is not concerned with the fees which dentists may charge or with the remuneration which they may receive. The only benefit which dentists are entitled to expect in return for the payment of their annual fee is the right to practise dentistry, and the protection which the Board can afford to them in this respect by instituting proceedings against unregistered persons for infringement of the Act. Had the annual fee been payable to the Government, as it easily might have been, dentists would have had little, if any, say in regard to its expenditure; the Board, on the other hand, while carrying out the primary duty of protecting the public, is able to have regard to the interests of dentists in so far as it serves a public purpose connected with the profession of dentistry to do so. Questions are often asked as to how the not inconsiderable income of the Board is expended. This income in 1929 was £43,000, and after paying the fees and travelling expenses of members, the salaries of the administrative staff and office expenses, including the publication of the Dentists Register, £335 was spent on an election of direct representatives of the profession to the Board; £1224 was spent on the prosecution of unregistered persons and of bringing cases of alleged professional misconduct before the Board, and other legal expenses and other items such as income-tax and the cost of prescribed examinations for persons desiring to be registered were provided for. In addition to this, post-registration and post-graduate lectures were given at a cost of £718; £5000 was granted for research; £4000 was spent on instructing the public in the importance of attention to their teeth; £21,000 was allocated for educational grants, and there was a balance for the year of £1434. The grants for research are expended through the Medical Research Council and the Department of Scientific and Industrial Research. Of the money for educational grants, a part is given to assist students educationally well qualified but not in a financial position to take out the curriculum—many of them are the sons of dentists registered under the Act of 1921, who in the old days would have been apprenticed to their fathers—and a part to other students carefully selected from secondary schools. The remainder is spent upon improving the teaching in the dental schools so that students may be as well qualified as possible to attend to the requirements of the public. In addition to this, considerable sums have been granted towards the building of dental schools and to improve their equipment so that the teaching may be given in the best possible circumstances. The memorandum concludes by pointing out that although all this money is primarily expended for the benefit of the public, incidentally the members of the dental profession do benefit considerably thereby.

A MISSION TO CHINA.

SOME years ago the Milbank Memorial Fund made a grant for improving the health of the population in a rural county of China supporting 400,000 inhabitants. The experiment is to last for five years, and is to include public health measures, agricultural extension, industrial education, social surveys, and research in methods of teaching. It

may appear untimely to undertake this task in a period of political crisis, but it is felt by the Chinese leaders of the Mass Education Movement that the experiment may be a foundation for more effective government activities when the situation improves. Hitherto, few public health measures have been put into effect in China, especially in rural districts; no accurate vital statistics exist, but records of sample populations indicate a death-rate of 30 per 1000, and an average expectation of life at birth of about 35 years. The inhabitants of Ting Hsien city, the headquarters of public health activities, are ignorant, poor, and superstitious; social conditions are bad, and in the whole county under experiment there was no one qualified to practise Western medicine when the scheme was initiated. Agricultural and educational work were begun in 1927 under Dr. James Yen, and have made considerable progress; in 1929 public health work was started, a small dispensary and clinics were established at the county seat, and a survey of health conditions and the collection of vital statistics were undertaken. Last spring vaccination against small-pox was introduced, and a preliminary programme for the extension of health services was formulated. Certain specific health problems are now being attacked—notably small-pox, trachoma, tetanus, and gastro-intestinal diseases—and gradually activities will extend to maternity and child welfare, while health education will be continued in the schools and among the general public. Hospital accommodation—necessarily limited at the outset—is to be provided for cases not involving serious operations or chronic conditions; maternity cases will be accepted, however. Research into the purification of water-supplies, protection of food, and disinfection of human fæces used for fertilising purposes will be undertaken. A health centre to be established in Ting Hsien will provide headquarters for the administrative and supervisory staff, a small infirmary of 25 beds, a pharmacy and public health laboratory, an out-patient department, and a lecture room for persons in training. The personnel will include a medical director, an assistant health officer, a public health nurse, a woman doctor to supervise maternity and child welfare work, an educational director, a laboratory worker, and a pharmacist. The infirmary will have a separate staff, including a physician, clinical aides, and nurses. Sanitary inspectors, visiting aides, and midwives will be trained at the centre, and a gradual extension of activities will be made to neighbouring villages. The aim is to make the experiment as economically as possible, in order that similar work may be carried on by the Chinese themselves.

INTERRUPTION OF PREGNANCY IN RUSSIA.

RECENT articles in the *Medizinische Welt* deal with the legalisation of abortion in Russia, which is having its effect on popular opinion in the adjoining countries. In Russia even before the revolution of 1917 abortions were frequent, but after it they became so numerous, and were so often followed by serious illness or death, owing to the conditions of secrecy surrounding the practice, that in 1920 the interruption of pregnancy, apart from medical reasons, was authorised with certain safeguards. The regulations prescribe that the operation may only be performed by a doctor, and in a hospital or officially approved establishment; any person other than a doctor attempting such an operation is liable on conviction to a fine of £50 and a year's imprisonment, extended to five years if the woman dies. In 1926 66 men and 805 women were convicted of this offence. The woman who desires this operation on other than medical grounds appears before a board which decides in the first place if there is any contra-indication; if none, her request may be approved if she is unmarried and workless, unmarried with one or two children, married with more than three children, or an insured woman who is suckling a baby. Other points, such as poor constitution, no private residence, or a husband on military service, may be taken into consideration. The operation must be done during the first three months of pregnancy. Abortions are now tabulated like births; in Leningrad during 1929 the births numbered 39,058 and the abortions 53,512; the birth-rate, for a population of 1,700,000, is 23 per 1000, which is conspicuously high. The deaths after abortion are not separately stated, but it is believed the mortality is higher than after parturition, though complications are decreasing. The chief difficulty is to provide enough doctors and equipment everywhere, especially in the country districts; but that is being done. The motives for the interruption of pregnancy may be found in the high cost of living and a desire to weaken the social prestige of the family, which helped in the early days of the revolution to buttress the old régime. But there are some even in Russia who would prefer to encourage education in preventive measures.

THE SERVICES

ROYAL ARMY MEDICAL CORPS.

Maj. J. M. Pinkerton is granted a temp. commn. in the rank of Capt., and relinquishes the rank of Maj.

The undermentioned Lts. to be Capts. (Temporary Commissions): J. D. Dillon, B. H. H. Tripp, G. de N. M. Somers, J. B. Carrigan, and R. S. de C. Bennett.

Lt. A. H. Weston resigns his commn.

ARMY DENTAL CORPS.

Lt. H. Quinlan to be Capt.

TERRITORIAL ARMY.

Capt. W. T. G. Boul resigns his commn.

Lt. L. F. Richmond (late R.F.A., T.F.) to be Lt.

TERRITORIAL ARMY RESERVE OF OFFICERS.

Lt.-Col. J. R. Pooler, having attained the age limit, retires and retains his rank, with permission to wear the prescribed uniform.

INDIAN MEDICAL SERVICE.

Maj.-Gen. F. H. G. Hutchinson retires.

DEATHS IN THE SERVICES.

Lieut.-Col. James Hickman, R.A.M.C., retd., who died on Dec. 18th, qualified with the L.R.C.P., L.R.C.S. Edin. in 1880, and joined the Royal Army Medical Corps two years later. In 1886 he served with the Burmese Expedition (medal with clasp), and in 1892 accompanied the expedition to the Gambia. He was also with the Ashanti of 1895–96 (star), and took part in the operations in Sierra Leone of 1898–99 (clasp). He saw considerable service in the South African War, being present at the relief of Ladysmith, the actions at Colenso and Spion Kop, and the operations on Tugela Heights (medal with clasp, bronze star, and 5th class Medjidie). He was also made Brev.-Maj. He retired in 1904, having reached the rank of Lt.-Col. in 1902.

HOSPITAL SWEEPSTAKES.—The recently formed Sweepstakes Inquiry Committee is sending out 100,000 copies of a questionaire designed to gauge public opinion on the proposal to organise sweepstakes on behalf of English hospitals. Recipients are asked to say if they object to sweepstakes on principle, if they would support an attempt to legalise them, and if they would join a "preliminary hospital sweepstake outside this country" when visiting a country where such things are not illegal.

MODERN TECHNIQUE IN TREATMENT

A Series of Special Articles, contributed by invitation.

CCCXV.

ASPHYXIA FROM COAL GAS.

THE toxic property of coal gas is due to the presence of carbon monoxide (CO). Death from poisoning by coal gas, except with deliberate intent, is comparatively rare, partly because the CO is considerably diluted, and partly because the unpleasant odour of coal gas gives timely warning of its presence. If a mild degree of poisoning is treated without undue delay, the patient is rapidly restored to normal. Employees of the Gas Light and Coke Company who are exposed to the smell of gas in doing repair work are advised to cease work for a spell and go for a short walk in the fresh air when they notice any dizziness, and to drink milk and soda. The theoretical basis of this treatment may not be very clear, but in practice it seems to be effective. There is some evidence that these men acquire a certain degree of immunity which enables them to withstand concentrations of coal gas such as would seriously affect persons unused to this work; also that these workmen show an average longevity greater than the normal throughout the Company. There is certainly no evidence in the contrary direction. CO requires a concentration of 0·5 per cent. in order to be rapidly fatal, while a concentration of two parts per 10,000 can be inspired for a prolonged period without ill-effect.

Patients who are unconscious when first seen provide a more serious problem. CO poisoning is far more common, though less notorious, in countries where charcoal fires are in use, and in districts like Turkey, where houses and harems are heated by charcoal braziers. I have seen many more cases of CO poisoning in parts of Italy and Turkey where no coal gas is used than in London. Since this form of suicide has become fashionable it has attracted much notoriety in the press.

Physical Signs and Symptoms.

CO is poisonous on account of its great affinity for hæmoglobin, whose power to convey oxygen is thus arrested, and anoxæmia ensues. The chief and most important result in serious cases is profound coma. The skin is reddish, the face pink rather than pale. Some authorities state that the red corpuscles are diminished. Cardiac dilatation and irregularity is present, and usually tachycardia; sometimes bradycardia. The pulsation in the neck is visible and violent, and vomiting may take place. Headache, giddiness, nausea, and indigestion are prominent symptoms, also weakness (especially of the lower limbs), fatigue, and drowsiness. Patients may complain of pain in the back and epigastrium, and muscular incoördination and diminution of activity of the five special senses may be noticed.

First-aid.

The first rule is promptly to remove the patient from the cause, or the cause from the patient. In most cases first-aid has been given by a layman before the doctor arrives, but this has not always been inspired by right principles. Those who have to instruct laymen in first-aid classes on this matter should give concrete and definite rules for one who finds a patient poisoned by CO. The following routine is that taught by me:—

Send someone to fetch a doctor, with instructions to explain to him the urgency and character of the case, and to return at once. Someone else should procure an oxygen or, better, an oxygen and CO_2 apparatus at hospital or chemist and obtain an ambulance.

In many cases a gas-filled room must be entered. If so, take two deep breaths and apply a handkerchief, towel, or other material (wetted if possible) to mouth and nose. Seize a stick or umbrella, and go in on all fours or crouching. Some months ago it was stated in a coroner's court that it was a mistake to enter a room on all fours in which coal gas had been recently liberated, on the ground that the poisonous gas was heavy and sank to the floor. The poisonous ingredient is, however, not the heavy CO_2 but CO, which is somewhat lighter than air. The tendency is for coal gas to rise when liberated in ordinary atmosphere, and later to become disseminated by diffusion throughout a room free from draught. Proceed rapidly to the window and break it with whatever implement is available. Then turn off gas tap or, if possible, discover the leak. It is necessary to remember that finding the leak with a lighted match is effectual, but fatal. Drag the patient out into the passage by his heels, and undo tight clothing, with help of bystander. Most important now is the performance of artificial respiration.

Artificial respiration.—If the patient is lying on his face, employ Schäfer's method, which is, generally speaking, the best method of artificial respiration. If the patient is lying on his back, and an assistant is present to hold the tongue out, do not waste time in turning him over if there be any difficulty in doing so, but perform artificial respiration by Sylvester's method. As a rule attempts at artificial respiration are abandoned too soon. They should be continued for several hours, changing the operator as he gets exhausted. Artificial respiration should not be started if the patient is breathing moderately well, as it will retard rather than help his respiration; nor should it be continued after his breathing is established. On the other hand, artificial respiration should not be abandoned because the patient appears to be dead. If he is not, this lack of perseverance may kill him. After artificial respiration has been successful in restoring life the following directions are important:—

Cover up the patient and keep him warm with hot-water bottles and wraps, protecting him from cold draughts. When he is conscious enough to swallow, and only then, give him hot coffee or tea. It is most important to give him only a few drops with great care at first, to test his ability to swallow.

When he is removed to a hospital or elsewhere the transport should be effected with the least possible disturbance to the patient. Rest is essential.

Treatment Other than First-aid.

Oxygen.—The main point of treatment is to get oxygen into the blood. When the patient has started breathing a suitable inhaler, to give 5 per cent. of carbon dioxide, should be procured if possible, since this gas stimulates the respiratory centre. Personally, I have found the hypodermic injection of oxygen in large quantities over limbs, buttocks, back, and abdomen, producing extensive emphysema of the skin, to be efficacious and safe. An advantage is that it can be carried out rapidly at the same time as all other measures are being adopted. The oxygen thus injected subcutaneously is rapidly absorbed and leaves no ill-effects. It must be remembered that the amount of O_2 which can be absorbed this way is small compared to that which can be taken in by the normal route—the lungs. Fresh air and artificial respiration as stated above are therefore of paramount importance. Some of the few who have given a fair trial have not found benefit but no one has found it harmful. On the other hand, most drugs which have been tried have done more harm

than good—e.g., stimulants, strychnine, camphor, and ether.

Blood transfusion and bleeding may be used together, but fail to do much good after the first hour.

The pulmotor or lungmotor apparatus are sometimes useful in skilled hands, but usually less efficacious than continued artificial respiration. In any case this should be used pending the arrival of the other two.

Contra-indications.

Stimulants are contra-indicated. It is not wise to dash cold water on the patient; you will incur the responsibility of causing the fatal attack of pneumonia which may result. The patient should not be allowed to stand or sit up, and any form of violence should be avoided. Time should not be wasted, since prompt treatment is the most important factor in recovery.

D. A. COLES, M.D., M.R.C.S.,
Medical Officer to the Gas Light and Coke Co.

MEDICINE AND THE LAW.

Unauthorised Autopsy.

UNDER this heading the *Solicitors' Journal* has noted an interesting Canadian case, recently reported, in which a plaintiff had certainly a genuine grievance. He engaged a firm of undertakers to make all preparations and arrangements for the burial of his dead wife, the body being given into their charge for this purpose. He subsequently discovered, so at least he alleged, that the undertakers had allowed a surgeon to enter their premises and, without any permission from himself, to conduct an autopsy and remove from his wife's body a portion of the anatomy. He claimed damages for this action, both from the undertakers and the surgeon, on the ground of the mental anguish which he had naturally suffered thereby. The court held that the action, being solely for the recovery of damages for mental anguish, was not maintainable. As our contemporary points out, English law has always made a difficulty about recognising property in a human corpse. Thus the plaintiff, with whose feelings everyone will sympathise, was left without remedy.

The point is perhaps worth elaborating. The judges have held, more than once in England, that there is no property in a corpse. Executors, however, are prima facie entitled to custody of a deceased person's body for the purpose of performing their duty of burial. It is conceivable also that there might be property in a mummy. If a corpse is stolen, an indictment would lie for stealing the shroud or wrappings round the body; the property in the shroud after burial remains in the person to whom it previously belonged. At common law a man could not legally dispose of his body after death, but the Anatomy Acts have made a breach in this principle. Section 8 of the Act of 1832 allows a man, either in writing or verbally before two witnesses, to direct that his body be examined anatomically; dissection may then follow (subject to certain conditions) unless the surviving husband or wife or the nearest known relatives require interment without such examination. Section 7 of that Act, not cited by our contemporary, would have had some bearing if circumstances similar to those in the Canadian case had occurred in England. The Section says it shall be lawful for any executor or other party having lawful possession of the body of any deceased person, *and not being an undertaker or other party intrusted with the body for the purpose only of interment*, to permit the body to undergo anatomical examination unless either the deceased had expressed a desire to the contrary or the surviving husband or wife or any known relative of the deceased shall require the body to be interred without such examination. The words cited in italics above convey the implication that the action of the Canadian undertakers, if it had taken place in England, would have been unlawful. There might thus have been a breach of duty even if the resultant damages still presented legal difficulty.

Foreign-made Surgical Instruments: Indication of Origin.

Proceedings were taken by the Board of Trade lately against a surgical manufacturing company on a charge of having failed to indicate in its catalogue which of the items set out therein were of foreign manufacture. This was an alleged infringement of the Merchandise Marks Act, 1926, which has, by successive Orders in Council, been applied to various articles. Part IV. of the large Merchandise Marks (Imported Goods) No. 4 Order, 1928, made two years ago on the application of the Surgical Instrument Manufacturers' Association, applied the Act to surgical, medical, dental, and veterinary instruments made wholly or mainly of metal and to all surgical, medical, dental, and veterinary appliances, except artificial eyes. Evidence was offered that a Mayo's needle holder, selected by reference to the catalogue, had been ordered from the defendant company, that there was no description of the origin of articles in the catalogue, and that the article actually supplied was of foreign origin. There was similar evidence of the ordering of another article from the catalogue; the article supplied proved to be of German origin and the purchaser sent it back with an inquiry whether it was of British or foreign manufacture; it was then returned with a small tab attached to it bearing the word "Foreign." The defence suggested that the order was on behalf of a medical practitioner who belonged to the Indian Medical Service, and that therefore the Act did not apply as the article was for dispatch and use abroad; but, as Section 2 of the Act is aimed at sale or exposure for sale in the United Kingdom, this was an unpromising loophole. As regards other articles, some were genuinely British, others were admittedly unmarked, and as to these the company pleaded guilty. The magistrate inflicted various fines with costs; he said the Act had been infringed and the company had pretended that the bulk of its goods were of British manufacture when in fact they were not.

The object of the Act is "to require an indication of origin to be given in the case of certain imported goods." Its supporters claim that this enables purchasers to "buy British" and thus promotes employment in this country. Its critics maintain that the "indication of origin" merely gives a gratuitous advertisement to a cheap or desirable foreign-made article. In the recent proceedings it appeared that the Mayo's needle holder was priced at 10*s*. 6*d*., at which price it could not possibly be British made, and that the price for the same article, if made in Britain, would be not less than a guinea. This raises a political issue on which the magistrate was careful not to express an opinion.

AN ITALIAN CONFERENCE ON CANCER.—The Lega Italiana per la Lotta contro il Cancro is holding its second national congress at Bologna on Jan. 4th and 5th, 1931. The congress will coincide with the opening of a centre for the study and treatment of cancer. The secretary may be addressed at the Clinica Medica, Policlinico S. Orsola, Bologna.

SPECIAL ARTICLES

THE CHEMISTRY OF MUSCULAR CONTRACTION.*

By Prof. Otto Meyerhof, LL.D.,

DIRECTOR OF THE PHYSIOLOGICAL INSTITUTE (KAISER WILHELM INSTITUT FÜR MEDIZINISCHE FORSCHUNG) AT HEIDELBERG.

To begin with I must review briefly the chemical processes involved in the performance of work by a muscle. The following description might be given of the course of events involved in a muscular twitch.

Coincident with contraction lactic acid is formed from glycogen, giving rise to about 385 calories of heat per gramme of lactic acid. With oxidative recovery the lactic acid disappears. It is not all burned, but a coupled reaction occurs in which a proportion, generally four-fifths, is resynthesised, the remainder being oxidised. Possibly none is oxidised, but an amount of carbohydrate equivalent to one-fifth of the lactic acid is burnt, while all the lactic acid becomes glycogen. It is, therefore, safer to speak of the ratio of the total lactic acid removed to the lactic acid equivalent oxidised. This figure I have called the "oxidative quotient." According to measurements made in my laboratory, the heat of combustion of glycogen (referred to one gramme of the hydrate in aqueous solution) is 3782 calories. One-fifth of this value (757 calories) is the amount of heat we should expect to accompany the production and oxidative removal 1·0 g. of lactic acid. Since the production alone accounts for 385 calories, the remaining 372 calories are to be looked for in the recovery phase. Thus the heat of recovery should be approximately the same as the heat of activity, a result which was arrived at by A. V. Hill several years ago.

This oxidative quotient is a figure of general significance in muscle metabolism and is not limited to the process of recovery after fatigue. For instance, a muscle resting in nitrogen produces lactic acid steadily; in oxygen no lactic acid accumulates. The lactic acid formed per hour in the absence of oxygen is, however, three or four times as great as could be burned by the oxygen which would have been used in the same time in aerobic conditions. Thus it is evident that a continuous cycle of reactions takes place, resting metabolism giving rise to three or four molecules of lactic acid which are continuously reconverted by respiration, while one equivalent of lactic acid is burned. The lactic acid which accumulates in the resting anaerobiosis is found to disappear subsequently in oxygen according to the same oxidative quotient. While this conformity suggests that we have here a correct interpretation of Hill's myothermic data in terms of chemical reactions, nevertheless recently discovered facts are forcing us to modify some essential details. In the first place, we have to abandon the idea that lactic acid itself plays a rôle in the mechanism of contraction, an idea which—although never considered a coercive conclusion of the thermodynamics of contraction—has nevertheless been a great favourite.

The Part Played by Phosphagen.

We are entering a hypothetical field if we proceed from purely thermodynamic considerations to a more definite representation of the physical and chemical processes involved in activity. Nevertheless, I should like to venture this step here, because it enables me to discuss some phenomena of great interest, although the part which they play in the mechanism of contraction is somewhat obscure. Difficulties are met at the beginning in attempting to explain the 385 calories of heat produced per gramme of lactic acid formed in the muscle (the so-called caloric quotient), because the difference between the heats of combustion of dissolved glycogen and dissolved lactic acid is only 180 calories. Part of the lactic acid is neutralised by the proteins of the muscle, liberating 140 calories per gramme of lactic acid thus neutralised; but part is neutralised by the phosphate and bicarbonate—a reaction only slightly exothermic—so that not more than 100 calories on the average may be attributed to the neutralisation process. This value may be reached by direct experiments in which acids such as valerianic are allowed to diffuse into a muscle. In such cases about 10,000 calories of heat have been observed per gramme-molecule. A similar figure of 9400 calories has recently been obtained by Dr. Stella (in Prof. Hill's laboratory) for the heat of neutralisation of carbonic acid allowed to diffuse into a muscle. Thus, if we include the cleavage heat of glycogen, about 280 calories would be accounted for, leaving the origin of the remaining 100 calories unknown.

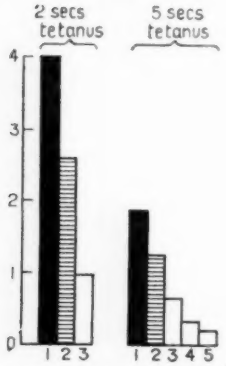
Now there is in fact another reaction known to occur simultaneously which, in vitro, produces about the required heat. Although it is still a matter of dispute whether the heat is liberated to its full amount in the living muscle, I cannot avoid discussing further this interesting possibility. Early in 1927 the Eggletons published the discovery that the greater part of the "inorganic" phosphate of resting muscles was actually present in the form of an unstable compound which they called phosphagen and which is split under the influence of muscular activity, while it is resynthesised during oxidative recovery. This compound was shown by Fiske and Subbarow to consist of phosphate and creatine. In coöperation with Dr. Lohmann, Dr. Nachmansohn, and lately Dr. Lipmann and Dr. Lundsgaard, I have thoroughly investigated the behaviour of this compound chemically and physiologically. For different kinds of activity and under different conditions the amount of phosphoric acid derived from phosphagen may be compared with the simultaneously produced lactic acid. In the course of anaerobic fatigue this quotient rapidly decreases from an initial value of three or four down to far below one, and even to zero—that is, in extreme fatigue hardly any creatine-phosphoric acid is split at all while the lactic acid production is still more or less proportional to the muscular tension produced. Moreover, this quotient is strongly affected even in fresh muscles by different influences—e.g., it is low from the beginning in curarised muscles and after nerve degeneration. If curarisation is effected by quaternary ammonium bases, the quotient may fall to as low as one-eighth of the normal value.

It is found, in fact, that the extent of phosphagen breakdown varies in strict parallelism with the speed of the excitation processes, and not only under the influence of curare and of nerve degeneration, but also in normal muscles at different temperatures and in different states of fatigue. Thus at 8° C. both speed of

* Abstract of a series of four lectures given at University College, London, in March, 1930.

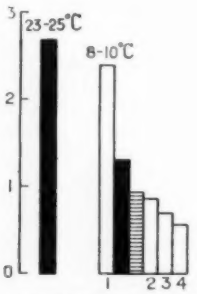
excitation and relative phosphagen breakdown have half the value characteristic of 24° C.; in a similar manner the slow muscles of the toad differ from the rapid muscles of the frog. Figs. 1 and 2 may help to demonstrate the change in phosphagen breakdown relative to lactic acid production. The restricted decomposition very noticeable in the case of trimethyl-octylammonium iodide corresponds to an equally

FIG. 1.



The phosphate production, relative to the lactate production, accompanying tetanic contractions, in various kinds of muscle at room temperature. 1. Normal frog. 2. Normal toad. 3. Curare. 4. Degeneration of nerves. 5. Trimethyl-salt.

FIG. 2.



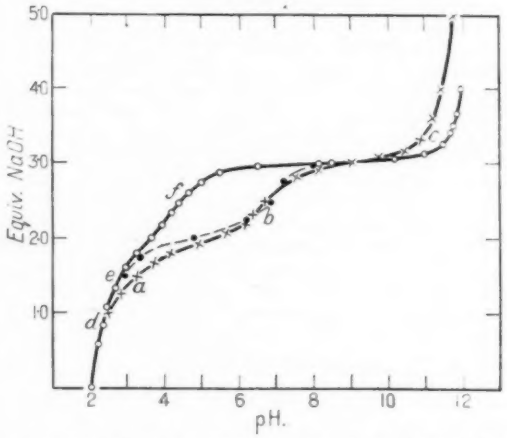
The phosphate production, relative to the lactate production produced by a series of twitches. 1. Veratrine. 2. Curare. 3. Degeneration of nerves. 4. Trimethyl-salt.

strong reduction in the speed of excitation (the chronaxy is 30 times longer than normal). But the breakdown was determined in these cases by estimations before and after activity. A detailed investigation of the time course of the reaction, however, shows that at the height of prolonged contraction much more phosphagen is split, about one-third of the quantity decomposed undergoing anaerobic restitution in the 20 seconds following relaxation. Moreover, the absolute quantity thus restored is nearly the same in cases where there is a considerable restriction of the total decomposition. During each single contraction, therefore, more phosphagen is split than can be accounted for by the final determination: indeed, with far-advanced fatigue the breakdown is almost entirely reversed anaerobically, a fact which seems to be of very essential importance.

As mentioned before, the hydrolysis of creatine-phosphoric acid is an exothermic reaction, yielding about 120 calories per gramme of phosphoric acid liberated. In 1927, in a paper read before a meeting of the British Medical Association, I voiced the opinion that this heat approximately covered the shortcoming in the caloric quotient. Later on, however, doubts arose as to the reality of the "breakdown" and "resynthesis" of phosphagen in the living muscle. I cannot now go further into these difficulties, which are chiefly connected with the anaerobic resynthesis, but I should like to describe two series of experiments carried out in my laboratory and not yet published which leave us in no doubt that the hydrolysis of creatine-phosphoric acid occurs in muscle just as in vitro and that it is of the utmost importance in the contraction mechanism.

The first series of experiments, which I made in collaboration with Dr. Lipmann, shows in a striking manner the reality of the hydrolysis. This hydrolysis, if carried out at a reaction only slightly acid, leads to the production of basic equivalents, because the guanidine group of creatine is very much stronger than the third valency of the phosphoric acid liberated at the same time (Fig. 3). At pH 6 the change is so marked that the hydrolysis of one molecule produces nearly one basic equivalent. At pH 7 the effect is considerably less, and at pH 8 it is vanishingly small. This liberation of base enables us to demonstrate the hydrolysis of phosphagen in a living muscle suspended in an atmosphere of nitrogen and carbon dioxide. In such a case, when bases are formed the muscle takes up carbon dioxide from the gas around, and when acids are formed carbon dioxide is expelled. These changes can be followed by measurements of the partial pressure of carbon dioxide in the surrounding gas, and we find that when breakdown of phosphagen occurs, carbon dioxide is, in fact, taken up by the muscle and the more so the nearer it is to pH 6—i.e., in a pure atmosphere of carbon dioxide. At this reaction, moreover, the hydrolysis of creatine-phosphoric acid is accelerated and lactic acid production checked. If the degree of alkalisation is determined from the uptake of carbon dioxide by means of the Henderson-Hasselbalch equation, it is found to be in conformity with the measured cleavage of creatine-phosphoric acid, after allowing for the lactic acid formation. Fig. 4 shows a curve of this nature in which the uptake of carbon dioxide is plotted downwards and the output upwards from the base line. The peculiar result is observed that the muscle under higher pressures of carbon dioxide actually grows more alkaline during the first hundred or two hundred twitches. It is clear that as long as the reaction of the muscle is displaced towards the alkaline side or remains unchanged; after activity, a heat of de-ionisation of protein cannot appear. For

FIG. 3.



The titration curves of creatine-phosphoric acid, before (*d*, *e*, *f*) and after (*a*, *b*, *c*) hydrolysis.

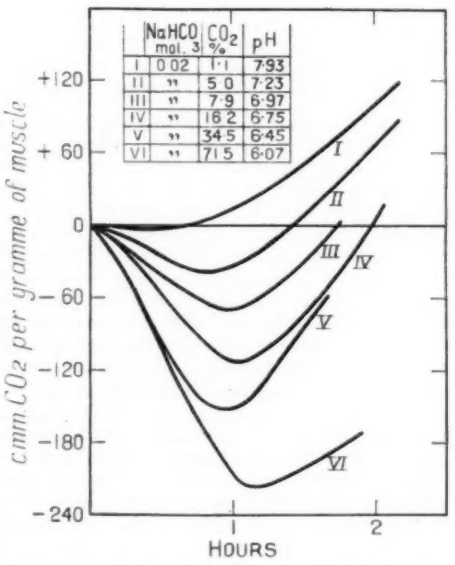
the present I should like to assume that in the earlier stages of fatigue the heat of hydrolysis of creatine-phosphoric acid acts, so to speak, as a substitute, whilst the heat of de-ionisation of protein gains prevalence in the later stages. Just this gradual substitution of one reaction by another may have the consequence that the heat appearing per unit of lactic acid formed will remain approximately constant or decrease very slightly with increasing fatigue. It seems that the changing of pH in the course of

contractions is not an essential part of the mechanism, but the breakdown of phosphagen is, nevertheless, of primary importance, as is shown by the recent experiments of Lundsgaard in my laboratory.

These experiments, perhaps even more convincing and exciting than those just considered, are leading to the following conclusions: 1. The formation of lactic acid during activity is a process only indirectly connected with the mechanism of contraction. 2. The hydrolysis of creatine-phosphoric acid has an importance as an energy-producing reaction equal to the formation of lactic acid.

According to Dr. Lundsgaard's communication published from Copenhagen, muscles poisoned with iodoacetic acid can perform a series of contractions without giving rise to any lactic acid, whereas phosphagen is broken down at an enhanced rate.

FIG. 4.

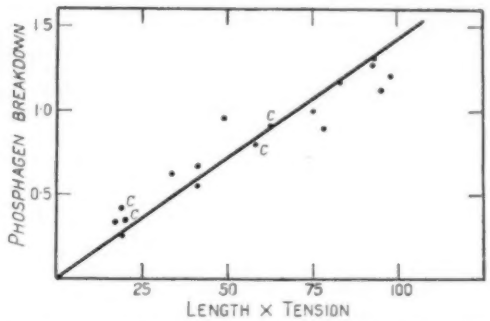


The uptake and discharge of CO_2 by muscles suspended in CO_2–N_2 mixtures and stimulated three times per minute. In all cases the muscle tends first to become alkaline.

When the phosphagen is used up the muscle goes into rigor. The quantitative investigations have been carried out by Dr. Lundsgaard in my laboratory at Heidelberg, and I should like now to quote some facts which have been proved in the meantime.

With an adequate degree of poisoning a frog muscle weighing about 1·0 g. can develop, under strictly anaerobic conditions, about 30 kg. of tension in a series of twitches (i.e., about one-quarter of the normal performance) without giving rise to any lactic acid. The phosphagen breakdown is strictly proportional to the work performed. Taken as a whole, the inorganic phosphate is not increased in amount, any phosphate liberated being afterwards esterified to the Harden-Young hexose-diphosphate. In point of fact the heat of hydrolysis of phosphagen is just sufficient to account for the energy liberated by the muscle because, per unit of tension, three or four times as many mols of phosphagen are decomposed as lactic acid would otherwise be formed. According to the foregoing figures the heat per unit of tension length would, therefore, have the usual value. The approximate constancy of the isometric coefficient of phosphagen in these muscles, and the agreement with the values determined for the heat of hydrolysis, may be seen in Fig. 5. The tension developed is plotted along the abscissa, and phosphate liberated per gramme of muscle along the ordinate. The continuous line is calculated from lactic acid experiments for the same amount of energy and tension. It must remain an open question whether the phosphagen breakdown and lactic acid formation in

FIG. 5.



Showing the strict proportionality between energy liberation and phosphagen breakdown in muscles poisoned with iodoacetic acid and stimulated with a series of single shocks (isometric contractions). C = Curare.

normal muscles must be dealt with as two completely separate energy-producing processes, or—as I am rather led to believe—the lactic acid formation supplies the energy for a continuous resynthesis of phosphagen at the moment of contraction. Indeed, Dr. Lundsgaard's experiments show that in a muscle poisoned with iodoacetic acid there is no anaerobic resynthesis and that the amount of energy produced, or work done, is unequivocally determined by the amount of phosphagen breakdown. The results of these experiments warn us that we must not be too rash in employing the chemical processes so far known to us for building up a theory of muscular contraction.

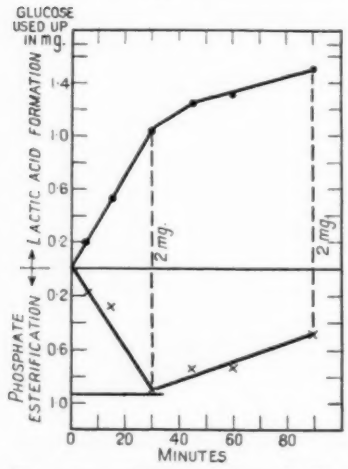
Study of the Lactic Acid-forming System in Vitro.

I should like to recall the enormous importance which Buchner's separation of zymase from yeast cell had for the chemistry of fermentation. I was able to show a few years ago that we may even succeed in isolating the lactic acid-forming system from muscle and setting it to work in a homogeneous solution. This system may be separated into its components, and the isolated enzyme may then be concentrated to a considerable degree and freed from accompanying substances by Willstätter's adsorption methods—particularly adsorption on aluminium hydroxide and elution by phosphate. By proceeding in the proper way extracts of muscles are obtained free not only from all structural constituents but also from carbohydrate. They are rich in enzyme, so the behaviour of various added carbohydrates, as well as the different phases of the acid production, may be studied separately and in detail. It is a further advantage of the study of lactic acid formed in solution that we are not limited to wearisome chemical determinations, but may effect the measurement of the lactic acid by means of the exact and comfortable manometric methods of Warburg.

It is a striking fact that glycogen, starch, and their various polysaccharidic hydrolysis derivatives, such as amylose, amylopectin, and the so-called hexosanes, are

all converted into lactic acid by the muscle extract with equal facility and speed. On the other hand, the hexoses are attacked very slowly if at all. An activator may be obtained by autolysing yeast and precipitating the yeast extract with 50 per cent. alcohol. The addition of this activator to a muscle extract allows the fermentable hexoses to be glycolysed with great rapidity. By itself this activator can do nothing, but its addition to the muscle extract induces hexoses to split even more rapidly than glycogen. This activator has, by the way, no connexion with insulin or Collip's glucokinin. I propose the name "hexokinase" for it, since it acts just as other auxiliary enzymes designated as kinases. We know very little about the mechanism of this activation. If the enzyme is separated from the activator by a collodion membrane and glucose is added to both sides, a weak activation may be observed, although neither activator nor enzyme can penetrate the membrane. It seems highly probable, therefore, that active glucose molecules of short existence are formed and react with the enzyme. At any rate the transformation of ordinary glucose into such an active form does not depend on the structure of the cell, for the yeast activator as well as the muscle extract are structureless. In a concentrated aqueous extract of rabbit muscle a slow lactic acid production from glucose takes place, even without the addition of an activator. In a recent paper, McCullagh and Case, of Hopkins's laboratory, mentioned that they could effect the splitting of glucose only with suspensions of mammalian tissues, not with tissue extracts free from cells. Personally I am inclined to think that it depends upon special technical conditions whether or not the factor which activates hexoses may be separated from the structure of the cell.

FIG. 6.



The course of lactic acid production from added glucose in muscle extract, and the associated changes in esterification of phosphate.

Fig. 6, taken from a series of experiments carried out some years ago, shows the change which a certain quantity of glucose added to an extract undergoes in the presence of hexokinase. The lactic acid formed is plotted upwards and the phosphate esterified is plotted downwards; both are shown on the same scale. It is apparent that the lactic acid is formed at the beginning at a very considerable rate, while simultaneously phosphate is esterified. Within 30 minutes the whole 2 mg. of glucose added are consumed, partly by formation of lactic acid and partly by esterification with phosphate. As the symmetry of the initial parts of both curves shows, the esterification of phosphate is approximately equimolecular with the lactic acid production. When, however, all the sugar is used up, a slow period follows in which the formation of lactic acid is accompanied by a reappearance of phosphate. Direct analyses show that hexose-mono- and diphosphoric esters are formed during the first period and broken down during the second. Since the rapid period lasts as long as sugar and phosphate are available, the yield of lactic acid in this period is determined in the presence of excess of sugar by the amount of phosphate available. Before approaching an interpretation of these phenomena I would first point out the complete analogy existing between these two phases of enzymatic formation of lactic acid and the time course of alcoholic fermentation by yeast extracts. Here, too, according to the fundamental discovery of Harden and Young, the same two phases are observable: a rapid fermentation phase during which phosphate is esterified to an extent proportional to the production of carbon dioxide; then a slow phase which is characterised by the fermentation of the hexose esters formed during the first phase. These facts are summarised in the Harden-Young equations of fermentation:—

(1) $2C_6H_{12}O_6 + 2H_3PO_4 \rightarrow 2CO_2 + 2C_2H_5OH + 2H_2O + C_6H_{10}O_4(H_3PO_4)_2$.

(2) $C_6H_{10}O_4(H_3PO_4)_2 + 2H_2O \rightarrow C_6H_{12}O_6 + 2H_3PO_4$.

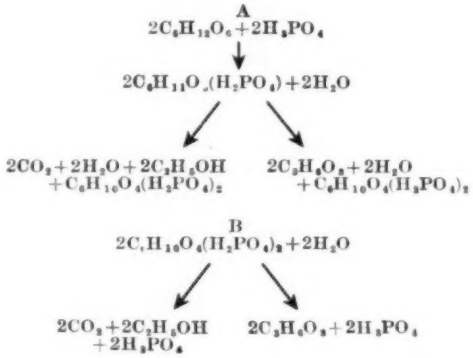
These equations give merely a balance-sheet, and do not supply any evidence as to the manner in which the formation of hexose-diphosphoric ester is related to the decomposition of the second sugar molecule. Moreover, they do not take into account the appearance of hexose-monophosphoric ester. This ester was not discovered until later by Harden and Robinson, and it has been since identified in muscle as well by Embden and Zimmermann. As a matter of fact, our investigations on the enzymatic formation of lactic acid have shown that hexose-monophosphoric ester is formed as well as the diphosphoric ester.

The study of phosphate esterification in muscle extracts provides a deeper insight into the mechanism of the Harden-Young equations of fermentation, because the phenomena related to this formation of ester are entirely identical in the cases of alcoholic fermentation and lactic acid production. First of all, it can be shown that the diphosphoric ester of Harden and Young is not itself the intermediary product of the decomposition. It is true that it is attacked even by such enzyme solutions as are incapable of decomposing hexoses or polysaccharides, —e.g., by stale enzyme solutions or such as have been heated to 38°. But while the ability to ferment hexose-diphosphoric ester is more permanent than the ability to split pure carbohydrates yet the rate of fermentation is much less. It may, in fact, be shown in various ways that an unstable ester arises as an intermediary product of carbohydrate cleavage. This ester is partly decomposed and partly changed to the Harden-Young ester—a process of stabilisation. But the unstable ester is a hexose-monophosphoric ester. We believe this because the biological hexose-monophosphoric esters behave in quite a different way from the diphosphoric esters in enzymatic cleavage. The diphosphoric ester is relatively slowly transformed, and gives rise to equimolecular quantities of lactate and phosphate. The monophosphoric esters, on the other hand, are decomposed very rapidly at first; exactly as rapidly as sugar. At the same time there is no formation of phosphate; on the contrary, there is a disappearance of inorganic phosphate from the solution. Part of the ester decomposes into lactic acid and part takes up the liberated phosphate—and more besides—and becomes hexose-diphosphoric ester. When all the monophosphoric ester is used up, the rate of lactic acid

formation falls off, and now the liberation of lactic acid is accompanied by equimolecular quantities of phosphate.

The Harden-Young Equations Applied to Muscle Extract and Yeast.

It can be proved by the addition of fluoride to this system that as a matter of fact hexose-monophosphoric ester is transformed directly into hexose-diphosphoric ester. To be sure, the diphosphoric ester appearing here is not the Harden-Young ester; to that question I shall return later. This observation, as well as a series of others, is leading plainly to the conclusion that hexose-monophosphoric ester is the intermediate body in the carbohydrate cleavage, and we must regard the Robison ester as the first step from the actual intermediate towards stabilisation. The true intermediate cannot accumulate because of its instability. Provided with this knowledge, we can formulate the Harden-Young equations afresh, both for muscle extract and for yeast.



The first of the Harden-Young equations is here divided into two stages, in the first of which the unstable hexose-monophosphoric ester is formed and in the second of which two molecules of it react in such a manner that one becomes a diphosphoric ester and the other forms two molecules of lactic acid. I have not so far mentioned that the analogy between lactic acid formation in muscle and the alcoholic fermentation is also demonstrated by the fact that the dialysable, thermostable co-enzymes necessary in the two processes are interchangeable. They have the same chemical properties, so far as these have been investigated. Although we do not know yet the exact part played by this co-enzyme, it is probably required for the esterification process indicated in the first equation of fermentation. It had already been proved by Harden that the hydrolysis of hexose-diphosphoric ester does not require the presence of the co-enzyme. According to the view of Harden and Young the hydrolysis of hexose-diphosphoric ester must precede the fermentation of its hexose, the latter being esterified again in accordance with the first equation. It has been shown, however, that hexose-diphosphoric ester can be fermented in solutions extremely poor in co-enzyme, and it can be converted into lactic acid by muscle extracts incapable of glycolysing sugar or glycogen (diluted extracts or extracts which have been heated to 37°). It seems, therefore, that the diphosphoric ester must be fermented direct without any previous hydrolysis, and this fact is expressed in the modified second equation above. Without doubt the hydrolysis assumed by Harden and Young takes place, but I regard it rather as a side reaction.

Objections have recently been made by members of Harden's laboratory to this modification of Harden's equation. It is claimed that hexose-monophosphoric ester must be considered as an intermediate product not only of the formation of the diphosphoric ester but also of its decomposition. This is surely true; I believe that the modified equations only represent a kind of ideal case, freed from the disturbances of accessory reactions. In fermentations by dry yeast further complications are added, such as the formation of the trehalose-monophosphoric ester recently discovered by Robison. Taking a broad view, we must suppose that sugar, by esterification with phosphate, is rendered susceptible to fermentative attack, and is thus brought to decompose. In a certain configuration the instability of hexose-monophosphoric ester is obviously especially great. This reactive ester—or such part of it as escapes immediate decomposition—tends to change into more stable modifications. Not all of these appear in the living muscle; the coördination of esterification and breakdown is presumably so complete that we find always one and the same ester. This coördination must be imperfect in the muscle extract, for here other esters appear. In consequence of this coördination, no measurable decomposition of hexose ester occurs in a muscle as a result of activity when a large quantity of lactic acid is suddenly formed. On the contrary, a temporary increase of hexose-monophosphoric ester is more likely to be observed in such conditions, perhaps because the esterification process is somewhat faster than the glycolysis. Precisely on account of this excellent coördination of the separate reaction phases, the actual chemistry of the reaction cannot be recognised in living muscle, but only in the separated enzyme solution.

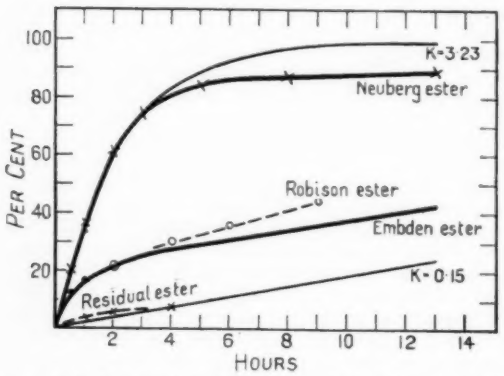
Further similarities between the glycolytic function of muscle and the fermentative function of yeast are revealed by the similar action of certain chemical substances on the two processes. For example, Harden showed that arsenates strongly accelerate fermentation in extracts of yeast on account of quicker splitting of the hexose-diphosphoric ester. Various experiments in my laboratory have convinced me that this is the only way in which arsenates accelerate fermentation in widely differing circumstances. For instance, the fermentation of glycogen proceeds at a three- or a four-fold rate in the presence of arsenate, because in the fermentation of glycogen in the absence of arsenate three or four hexose-phosphoric ester molecules would accumulate per molecule of hexose fermented. In muscle extract arsenate has exactly the same effect. From these and other analogies we must conclude that esterification with phosphate is the common initial stage of both the alcoholic fermentation and the formation of lactic acid and, moreover, that the same three-carbon compound is most probably the next stage in the decomposition. According to Neuberg's and Dakin's theories this product may be methylglyoxal; most tissues contain an enzyme capable of converting methylglyoxal into lactic acid. These theories have been recently confirmed by Ariyama, who obtained methylglyoxal from hexose-phosphoric ester by means of tissue extracts. Neuberg has observed a similar action of dry yeast preparations. But from this point onwards there must obviously be a separation in the courses followed by the yeast enzyme system and the muscle enzyme system. Whatever may be the differences in detail, there is a surprising similarity between the two kinds of anaerobic carbohydrate katabolism in cells so different as those of a facultatively anaerobic micro-organism

and those of the muscles of the higher animals. This agreement leaves no doubt that the metabolic processes, for all their striking variety, are based on definite and uniform biochemical laws.

The Phosphoric Esters of Muscle.

The physiologist Embden, of Frankfurt, assumed that of the acid-soluble phosphate in muscle only one compound took a share in the formation of lactic acid. He designated it "lactacidogen." It was believed to

FIG. 7.



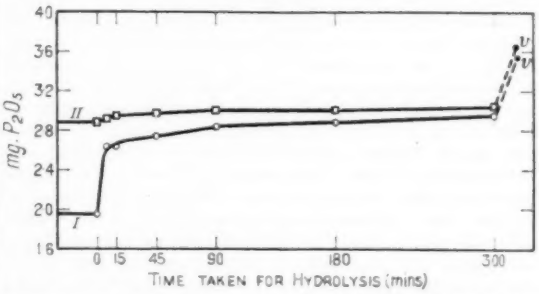
The hydrolysis of certain hexose-phosphoric esters in normal hydrochloric acid solution at 100° C. Such curves reveal the composite nature of some of the natural esters.

be closely related to, or even identical with, the Harden-Young hexose-diphosphoric ester of fermentation, but in muscle it was said to split into equimolecular amounts of lactate and phosphate. In the place of this one phosphoric ester we have now three separate groups of compounds playing different parts in the metabolism of activity. Their only point of comparison lies in the fact that from them all orthophosphate may be liberated enzymatically. In only one respect is the older conception justified: it is that we must consider a hexose-phosphoric ester to be the intermediate product in the formation of lactic acid from glycogen.

We will begin by considering this group of hexose-phosphoric esters. All of them can arise in, and can be fermented in, either yeast-press juice or muscle extract. A very simple method serves for the distinction of the known hexose-phosphoric esters and for the detection of new ones, a method which K. Lohmann has worked out in my laboratory. The rate of hydrolytic liberation of phosphate in a protein-free solution at 100° C. in the presence of normal hydrochloric acid is measured. In the case of a single pure ester the curve obtained is that of a monomolecular reaction with a certain characteristic constant. The course of such an acid hydrolysis is shown in Fig. 7 for the hexose-phosphoric esters already known; the upper heavily traced curve refers to the Neuberg ester obtained by the partial hydrolysis of the Harden-Young diphosphoric ester. In this case there is at first a very rapid hydrolysis, and when 80 per cent. of the phosphate present has been split up there is a sudden decrease in the rate. When the velocity constants of this hydrolysis are calculated, two values are obtained, one of which is applicable to the first 75 per cent. and the other—20 times smaller—is applicable to the last section of the curve. Robison's ester (from yeast extract) or Embden's ester (from fresh muscles) behave like the Neuberg ester only for the first 10 per cent. of the hydrolysis: then the velocity constant changes to a value only one-tenth as large. It can be shown in numerous ways that these esters are mixtures, consisting mainly of two components. The more easily hydrolysed component is a ketose ester, the other contains aldose. The two components may be separated from each other, for example by hydrolysing the ketose ester and preparing the aldose ester from the more resistant residue. The lowest curve in Fig. 7 was obtained from the aldose component isolated in this way. It is seen to have a perfectly steady hydrolysis constant. Other methods of examination have all led to the same result—namely, that the Embden ester and the Robison ester are made up of about four-fifths aldose and one-fifth ketose, whilst the Harden-Young ester, and the Neuberg ester obtained from it, contain four-fifths ketose and one-fifth aldose. Moreover, these esters have always the same composition and arise whether glucose or fructose is the initial body undergoing fermentation. Some time ago Robison and Morgan achieved a similar separation of the components of the Robison ester by fractional crystallisation of the brucine salt, whilst Pryde and Waters defined the aldose and ketose components of Embden's ester in the same way as we did. The kinetics of breakdown of these esters by the lactic acid-forming enzyme are completely alike, a fact which points to close relationship or to the ease with which each of them may be converted into the other.

The hydrolytic method, however, not only permits a characterisation of the known esters and their distinction without chemical methods of separation; it also leads to the discovery of new esters. These newly found esters appear as intermediate products, not only in the transformation of genuine carbohydrate

FIG. 8.



The hydrolysis of the complex phosphates of muscle by N HCl at 100°. Curve I, fresh muscle extract. Curve II, autolysed muscle extract. The rapidly hydrolysing component present in the fresh extract is pyrophosphate.

but also as products of the esters already known. They may accumulate if glycolysis is inhibited in certain ways—e.g., by means of fluoride. Embden was the first to recognise that when fluoride is added to minced muscle an accumulation of hexose-phosphoric ester—which he thought to be the Harden-Young ester—takes place, while the formation of lactic acid is inhibited. The investigations by means of the hydrolysis method carried out by Dr. Lohmann demonstrate that, while some Harden-Young ester is formed, the main product is a hexose-diphosphoric ester of entirely different characteristics. Its hydrolysis constant is 20 times smaller, and its salts are much more soluble. This "fluoride ester," as we may provisionally call it, arises not only in the

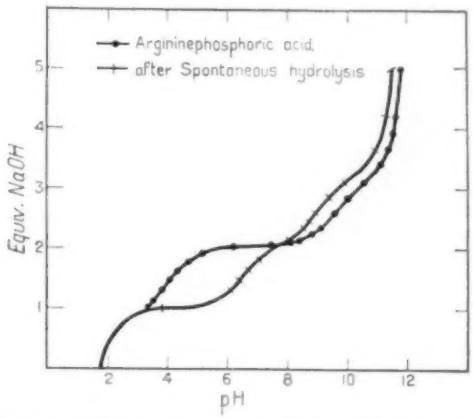
transformation of free carbohydrate but also in the transformation of the Harden-Young ester, in the presence of fluoride.

Pyrophosphate of Muscle and its Hydrolysis.

All these compounds are, from a purely biological point of view, only of secondary interest, for they appear with such variety only in aqueous extracts of cells, not in the living muscle itself. It is quite different, however, with the next phosphorus fraction we shall consider. Embden described several years ago a method for the estimation of "lactacidogen" which consisted in measuring the increase in inorganic phosphate content which takes place in muscle tissue when incubated in the presence of bicarbonate at 42°. But Lohmann's investigations have shown that the overwhelming part of the phosphate liberated during this autolysis does not take its origin from a hexose-phosphoric ester and has no direct relationship with lactic acid formation. He found it to be derived from the pyrophosphate of the muscle by hydrolysis. If a trichloracetic acid filtrate of fresh muscle tissue is hydrolysed, a hydrolysis curve such as is shown in Fig. 8 (Curve 1) is obtained. In normal hydrochloric acid at 100° C. a certain fraction of the "organic" phosphate is hydrolysed to orthophosphate within seven minutes. If the acid hydrolysis is repeated with the filtrate of an autolysed minced muscle, a hydrolysis curve such as Curve 2 will be obtained. The rapidly splitting compound has disappeared whilst the orthophosphate starts at a correspondingly higher level. Now none of the hexose-phosphoric esters is liable to such rapid hydrolysis but pyrophosphate hydrolyses at just such a rate, and indeed pyrophosphate was successfully isolated in a pure state from fresh muscles.

It was found that all cells contained this pyrophosphate fraction but that the largest amounts are found in muscle and in yeast, which seems to indicate that the pyrophosphate may have some kind of share in the katabolism of carbohydrate. The pyrophosphate found in the muscle is not free but, as Dr. Lohmann's further investigations proved, is linked to adenylic acid. The latter is a derivative of nucleinic acid, and was discovered by Embden in muscles and proved by him and by Parnas to be the source of the ammonia which is set free in a muscle during activity. This adenylic-pyrophosphoric acid plays an unexpected rôle in the formation of lactic acid in muscle. Muscle and yeast cells contain the same co-enzyme, which takes the same share in alcoholic fermentation as in lactic acid formation. The lactic acid-forming enzyme in its purest form is able to produce lactic acid from added carbohydrate when phosphate and boiled muscle juice (co-enzyme solution) are added. If, however, the boiled muscle juice is made from a stale extract, it turns out to be unfit for the activation of the purified enzyme solutions. Its activity is restored if a certain fraction from the barium precipitate of a muscle extract is added. Adenyl-pyrophosphoric acid is the effective substance in the barium precipitate. During autolysis of muscle as well as during incubation of fresh muscle extract this nucleotide is decomposed, the pyrophosphate group being split off and ammonia lost, leaving inosinic acid (hypoxanthine-ribose-phosphoric acid). An autolysed co-enzyme solution becomes effective again by adding pure adenyl-pyrophosphoric acid which has been obtained from fresh muscle extract. We must, therefore, consider adenyl-pyrophosphoric acid as a member in the chain of substances necessary for lactic acid production or alcoholic fermentation, since the above experiments can be repeated with the same result by using well-washed dry yeast. The nucleotide compound becomes effective in the co-enzyme system only together with a second constituent; we may, therefore, consider it the complement of co-zymase. Now it was found that adenylic acid itself shows this complementary activity, and the explanation of this fact is very interesting. Lehnartz, in Embden's laboratory, described an increase in pyrophosphate in muscle-press juice when adenylic acid was added, and we then realised that adenyl-pyrophosphate was

FIG. 9.



The titration curve of arginine-phosphoric acid before and after hydrolysis.

synthesised from adenylic acid in the presence of orthophosphate by means of enzyme extract of muscle. This peculiar synthesis goes on extremely fast for a couple of minutes after the adenylic acid has been added. Here we have an explanation of Euler's observation that pure co-enzyme preparations, if they were effective, always contained adenylic acid.

Creatine- and Arginine-phosphoric Acids.

Finally, I have to say something about the third phosphate fraction in muscle, the "phosphagen," which until 1927 was determined as part of the inorganic phosphate of the muscle. The Eggletons found phosphagen (creatine-phosphoric acid) in vertebrate muscles only; the muscles of invertebrates, which are almost entirely lacking in creatine, were naturally found to contain no creatine-phosphoric acid. The considerable importance of creatine-phosphoric acid being proved, we looked for its substitute in similarly acting muscles of invertebrates; this substitute we discovered to be arginine-phospboric acid. Chemical investigation of both compounds revealed analogous structures.

Creatine-phosphoric acid.	Arginine-phosphoric acid.
$PO(OH)_2$	$PO(OH)_2$
NH	NH
C : NH	C : NH
$N.CH_3$	NH
CH_2	$(CH_2)_3$
COOH	$CHNH_2$
	COOH

That the guanidine group is bound directly to the phosphoric acid (i.e., that we are dealing with a

substituted amino-phosphoric acid) is shown by the similar behaviour of amino-phosphoric acid ($NH_2PO(OH)_2$) when submitted to acid hydrolysis. For the arginine compound this conclusion may also be drawn from the fact that the α-amino group remains free. Moreover, it follows from the electrotitration curves shown in Figs. 3 and 9. It will be seen that in both cases, when hydrolysis takes place in faintly acid solution (about pH 6), a free basic equivalent arises, because the strong guanidine group is liberated together with the very weak third valency of phosphoric acid. In spite of the great similarity of the two natural phosphagens, they show differences in chemical properties. For methodical reasons a most important distinction is that with creatine-phosphoric acid the splitting is strongly accelerated by molybdate, while it is just as strongly retarded in the case of the arginine-phosphoric acid. It is for this reason that arginine-phosphagen could not be detected by the method used to detect creatine-phosphagen.

The universal occurrence of the phosphagens is interesting from the biological point of view. All vertebrates, even amphioxus, contain creatine-phosphoric acid in their striated muscles. On the other hand, all classes of invertebrates utilise arginine-phosphoric acid. We have, therefore, evidence of a genuine chemical mutation at the beginning of the vertebrate stock. As to their physiological functions, the two substances are obviously equivalent. Arginine-phosphoric acid, however, is also contained in certain invertebrate unstriated muscles, but only in those which resemble the striated muscles of vertebrates, such as the longitudinal muscles of holothuria and the pharynx retractor of sipunculus, while it is absent, for instance, in the mantle muscles of the octopus. It is contained in the striated part of the muscle of pecten but not in the white, the so-called tonus, muscles. There it is obviously connected with the relatively rapid functions of the striated muscles. Indeed, it is decomposed with quite different degrees of facility according to the speed of response of the respective muscles; for instance, it is decomposed very fast in the rapid pecten muscles but only very slowly in the muscles of holothuria. Since the heat of hydrolysis of arginine-phosphoric acid is about the same as that of its creatine analogue, we may assume that it plays the same important rôle in the transformation of energy.

Although it is not possible here to give more than a limited section of the newly discovered facts concerning the acid-soluble organic phosphates in muscle, it is clear that much knowledge has been gained about them in the last few years. This knowledge is not sufficient yet to form a satisfying and coherent description of the chemistry of muscular activity, but we may confidently hope that in a few more years a working hypothesis will emerge and bring some degree of order into the mass of new facts which we are accumulating. I entertain great hopes that much progress will be made by the use of Prof. Hill's myothermic methods, and I am sure that progress will be accelerated by the pleasant coöperation between our two laboratories.

PRESENTATION TO A MEDICAL MAN.—Mr. Frank Barnes, who retired a year ago after 27 years' active service on the medical staff of Birmingham General Hospital, was recently presented with an illuminated address, and the hospital with his portrait. Mr. Barnes has been successively resident surgical officer, surgical casualty officer, assistant surgeon, honorary surgeon, and a member of the board.

THE TERCENTENARY OF QUININE.

RECEPTIONS AT THE WELLCOME HISTORICAL MEDICAL MUSEUM.

THE three-hundredth anniversary of the first recognised use of cinchona by Europeans has been celebrated during the past fortnight at the Wellcome Historical Medical Museum by receptions and the inauguration of a special exhibition. On Dec. 8th Cardinal Bourne took the chair, and an address was given by the Marquis de Merry del Val, Spanish Ambassador. The French Ambassador, Mr. A. J. de Fleuriau, and the Envoy-Extraordinary for Peru, Señor Don A. Gonzalez-Prada, also spoke. In the evening the Netherlands Minister, H. E. Konkheer R. de Marees van Swinderen, presided, Archbishop Goodier, S.J., gave the address, and General C. G. Dawes, American Ambassador, and Prof. F. van der Wielen, of Amsterdam, also spoke.

On Dec. 10th Mr. H. S. Wellcome, LL.D., took the chair, and Sir David Prain gave an address on the

History of Cinchona Bark.

The trees exploited in the forests of Loja, now Southern Ecuador, had been first examined critically, he said, by members of the French scientific expedition, under M. de la Condamine, which had spent the period 1737–43 in the measurement of the arc of a meridian in South America. The botanist of the expedition had been Joseph de Jussieu. As the result of his observations, Linnaeus, in 1742, had been enabled to found the genus cinchona in honour of the lady alleged to have brought the bark to Europe. It had been said that the natives who collected the bark had not known of its medicinal properties, but had believed it to be wanted for tanning leather or dyeing cloth. Natives, however, were not always anxious to convey their knowledge to their neighbours. The Marquis de Merry del Val had expressed the opinion—long held by the speaker—that the Indians had been well aware of the virtues of the bark, and de Jussieu had said that Jesuits in Peru knew its value in 1600. In this case the tercentenary was being celebrated a generation too late. By whatever means the bark had reached Europe, it had been known in Rome in 1639, having been sent to a Jesuit who had been sent there from Spain, and in 1643 had become a cardinal. The Jesuits had distributed the bark free to the needy and charged a high price for it to the wealthy. From Italy it had found its way to the Low Countries and thence to England, where a fortunate apothecary, one Talbor, had cured Charles II. with it. He had thereby incured the enmity of the London practitioners of his day and persuaded politically minded persons to assert that Charles must be a Catholic or he would never have taken a bark recommended by a cardinal. Indeed, the name of "Jesuit's bark" had long stood in the way of its use in medicine. Talbor had subsequently cured Louis XIV., who had bought the secret for £2000 and made it public. It had found favour with the courtiers; Lafontaine had written a long poem in honour of "quinquina," and in 1681 Mme. de Sévigné had written that it would soon become the fashion to take the bark after every meal like tea or chocolate. Racine, in a letter to Boileau, had said he did not know the honest man who, if he had taken quinine without effect, would have the hardihood to say so.

The cinchona bark recognised in the London Pharmacopœia of 1677 was the "Crown bark" of Loja; red bark appeared a century later. The

exploitation of the forest product had led to gradual diminution of supply and increased cost of collection. In 1735 Ulloa had called attention to the fate likely to befall the trade unless measures of forest conservation were taken. By 1785 the red bark (*Cinchona succiruba*) had been in general use in Europe and had been considered as useful as *C. officinalis*, and by 1790 yellow bark from Bolivia had become popular. In 1792, Fée had urged South America to cultivate cinchona, but instead exploitation in New Grenada had been undertaken. With the exhaustion of grey and yellow barks the exploitation of Columbian barks set in, and at last cultivation had been started: by France in Algeria in 1849, by Holland in Java in 1854, and by England in Ceylon and South India in 1861. Many climatic difficulties were, however, encountered; the climate of India was suitable but the soil was less satisfactory. Moreover, there was a difference in the adaptability of particular kinds of cinchona to changed conditions: Columbian barks had not flourished in Asia; red and grey bark had accommodated themselves, even to the unsuitable soil and climate of the Himalayas, and yellow bark grew in Sikkim and Burma but not in Ceylon and South India. The alkaloid content of different barks also varied, and the cultivator had to pay attention to the selection of strains, and still more of particular kinds. From the economic standpoint the nature of the alkaloids was even more important than their total amount.

Sir David Prain then proceeded to a discussion of the value of the various alkaloids. A vote of thanks to him was proposed by Mr. J. Ramsbottom, who mentioned the historical material now on show at the Linnean Society's rooms, and referred to the work of Sir Hans Sloane in popularising the bark. Prof. E. J. Salisbury, seconding, paid a warm tribute to the work of Dr. Wellcome and others for their synthesising influence in an age when specialisation was causing workers in different branches to become further and further divided. Sir Reginald Wingate gave some reminiscences of the Sudan, and the work of the Wellcome laboratories there.

Sir John Rose Bradford took the chair on the evening of Dec. 10th when an address was given by Sir Humphry Rolleston, who reviewed the history of quinine with many interesting and erudite anecdotes.

Therapeutics of Cinchona.

About 30 alkaloids had been obtained, he said, from cinchona bark, and they were all general protoplasmic poisons. The crystallisable ones were quinine, cinchonidine, quinidine, and cinchonine. The most powerful antiseptic was quinine, followed in order by quinidine, cinchonidine, and cinchonine. Quinidine was less effective in malaria than quinine, but was the most valuable in restoring the heart rhythm. Cinchona and its alkaloids had been used in a very wide variety of diseases. It had been given in fevers of all kinds, especially in the early days. Its vogue in the prevention of malaria was only second to its curative effects. Its reputed antipyretic action could not be explained by any influence on protein metabolism (Hardikar). On account of their action as general protoplasmic poisons, quinine and its derivatives had some action as local anæsthetics, acting on the nerve-ending. Bromides had largely superseded quinine in Ménière's disease because its local toxic action caused labyrinthine disorder. Small doses increased the activity of smooth muscle and had been thought to shorten labour and favour uterine retraction. The alkaloids were the only real specific for malaria, although hundreds of other drugs had been recommended. In 1791 A. E. Brande had declared that angostura bark was as good in ague, dysentery, and putrid sore throat. In 1792 Samuel James had published observations on the superiority of a species of willow in the cure of agues, intermittent fevers, fluor albus, abscesses, and hæmorrhages, while in 1803 G. Wilkinson had advised broad-leafed willow bark for various diseases. In 1793 William Roxburgh had compared a species of mahogany with the Peruvian bark. More recently, organic arsenical preparations had been shown to be useful adjuvants, but were not specifics. Thomas Fowler (1736–1801), of "Fowler's solution," had written to Andrew Duncan that on several occasions he had been cured of remittent fever by eight drops of the "mineral solution of arsenic" thrice daily. The statement that malarial parasites might become resistant to quinine was based partly on reports of cases, and partly on the analogy with trypanosomes and other protozoal parasites. In fact, however, quinine-resistant plasmodia were very rare. Cases where quinine seemed not to control the fever were probably accounted for by failure of absorption or inadequate dosage. How exactly it exerted its action was not yet clear; it might act indirectly by producing a metabolite in the tissues. Hatcher and Weiss had estimated that 95 per cent. of quinine injected intravenously disappeared from the blood in five minutes and thought that it collected in the capillaries. Another view was that quinine favoured the production of antibodies, and it had been thought to form a film on the corpuscles and so prevent the entrance of the parasites. Quinidine was the dextro-isomer of quinine; its real nature had been determined by Pasteur in 1853. It had, weight for weight, five times as powerful an action as any other alkaloid in restoring the normal heart beat in auricular fibrillation. Hydroquinidine, the chief impurity of commercial quinidine, had a slightly more powerful action. Ethyl-hydrocupreine had been advocated for pneumococcal infections, but had proved disappointing in man.

Mr. A. R. Melluish proposed a vote of thanks to Sir Humphry Rolleston, and pointed out the aid given by pharmacists and chemists to the use of quinine. He deprecated the fact that only 10 per cent. of the quinine produced to-day came from the British Empire. The vote was seconded by Lieut.-Colonel C. T. Samman, who pointed out that a former Master of the Apothecaries had invented field cases for the transport of the plant.

Malaria and Quinine.

At a reception on Dec. 15th Sir Charles MacWatt, Director-General, I.M.S., 1922–26, spoke on malaria and cinchona in India, admitting that he had himself taken a daily ration of quinine over a period of 25 years. No one who cannot take quinine should, he thought, be passed as fit to reside in malarious regions of the tropics. It was unfortunate that at present India supplied only 4 per cent. of the cinchona bark needed, and he asked for further and intensive efforts to increase the production of cinchona within the British Empire. On Dec. 17th Mr. T. E. Wallis, reader in pharmacognosy—a subject of study recently admitted into the degree examination of the University of London—described how the pharmacognosist is able to define the form of cinchona bark most serviceable to the physician, to control the purity and identity of the drug, to analyse materials containing it, and to suggest new directions in which the bark may possibly be still further utilised. At the final meeting on that evening, Dr. G. Carmichael Low,

as president of the Society of Tropical Medicine, occupied the chair, and Dr. P. Manson-Bahr gave an address on quinine therapy in malaria from the aspect of the practical physician. He was followed by Dr. H. H. Dale, director of the National Institute for Medical Research, who commented on the curious fact that the medicinal treatment of malaria had changed only in detail during the last 300 years, in striking contrast to that (say) of syphilis or kala-azar. The cinchona alkaloids were still without a serious rival in the treatment of malaria, but why these alkaloids in particular were antagonistic to malaria infection remained a mystery. It was, he said, the great merit of Ehrlich that he had focused the search for remedies acting on the causes of infection, not simply on its symptoms; the resounding success which he achieved in the case of salvarsan had led to a hope of establishing a general connexion between chemical structure and biological effect, which was not yet realised. We were still at best only groping towards it. Although nothing better than cinchona had yet been synthesised, the work of W. Roehl on the action of the synthetic plasmoquine opened up a new field of investigation. Dr. C. M. Wenyon, director-in-chief of the Wellcome Bureau, gave some striking illustrations of the prompt action of quinine on the malarial parasite, although, he said, cinchona is powerless to prevent malarial infection. He was one of those who doubted the value of the daily prophylactic dose, if continued for longer than a month or two; but he looked forward to the day when there would be no more malaria and people would refuse any longer to tolerate the mosquito. The evening ended with a warm tribute to the organising ability and generosity of Dr. Wellcome, to which he briefly responded.

IRELAND.

(FROM OUR OWN CORRESPONDENT.)

SCHOOL CONDITIONS.

THE national executive of the Irish Trade Union Congress has requested the Minister for Education in the Irish Free State to receive a deputation to discuss the condition of the primary school buildings in the rural areas, and the need for providing funds for repairs and upkeep. At present the schools are the property of the managers, usually the local clergymen, and the State has no responsibility for their condition or their upkeep. The national executive is of opinion that many of the country schools are a menace to public health. A medical inspector in County Cork is quoted as saying that if a certain school remained open he would not be responsible for the health of the district. The Minister for Education has admitted that 111 schools require the provision of sanitary accommodation. This probably means that they are without any such accommodation, for, in the great majority of country schools, the only accommodation provided is an inadequate privy, which is seldom cleaned. The executive quotes examples of school buildings in a shockingly insanitary condition in several counties. One school in County Kerry, which has an average attendance of 112 children, is situated in the middle of a village, and has no sanitary accommodation whatever. The school medical officer for County Cork has reported that in 56 per cent. of the schools inspected by him the accommodation is unsatisfactory.

The Labour executive is calling attention to an age-long scandal on which the medical profession has time after time attempted to rouse the conscience of the Government. The head of the primary educational system under the old régime told a deputation which interviewed him on the subject years ago that he was not concerned with the health of the children attending the public schools, that his only business was with their education. When the Act providing for medical inspection of school-children became law in 1919, no power was given to the medical inspectors to inspect or report on the condition of the school buildings. The Government feared the effective opposition of the school managers if such a clause were inserted in the Bill, and the duty of the inspectors as laid down by the Act and the Regulations was confined to attention to the children themselves. Fortunately no such limitation affects the functions of the county medical officer of health, whose duty it is to report on any conditions adversely affecting the health of the people of his county. The Labour executive is of opinion that, until the burden of the care of the school buildings is taken from the shoulders of the managers and put on the public, the buildings will remain a menace to the health of the children.

In the meantime it is pleasant to note a small advance in the care of school-children which was made by the Dáil just before its adjournment last week. Hitherto the power to provide meals for school-children was limited to the authorities of the four county boroughs. A private Bill, introduced by Mr. Shaw, which proposed to grant similar powers to other urban authorities, was before the Dáil. It had little chance of passing through its several stages before the recess, but the Minister for Local Government and Public Health came to its rescue and adopted it as a Government measure, thereby speedily passing it through its remaining stages. The leader of the Labour Party, Mr. O'Connell, urged that similar powers should be given in rural areas as well as in urban, as was indeed recommended four years ago by the Committees of Inquiry on National Health Insurance and the Medical Services. The need for school meals is greatest in the rural areas where many of the children have travelled long distances. Dr. O'Higgins properly reminded the House that the argument for school meals is not based on the poverty of the children but on their requiring a warm meal in the middle of the day.

APPEALS BY VOLUNTARY HOSPITALS.

MOST voluntary hospitals throughout the country find themselves at the end of any year with a debit balance on routine maintenance expenditure. When extensions, reconstructions, or renewals on a large scale are contemplated, special appeals have to be issued. The present time of industrial depression was deemed inopportune for the launching of some of the appeals which had been contemplated this year; other hospitals had already embarked on schemes for capital expenditure which were deemed to be essential, and decided that it was necessary to try to raise extra money.

We append a list, which is by no means complete, of hospitals with outstanding special appeals. The information it contains was received at various times during the autumn months, and some at least of the hospitals concerned have since collected more money.

If notice is received within the next few days of other hospitals which are appealing for help for special purposes, a further list will be published.

TABULATED LIST OF HOSPITALS WITH SPECIAL APPEALS.

Name of town and hospital.	Date of appeal.	Amount required.	Amount received.	Purpose.
		£	£	
ALTON: Lord Mayor Treloar Cripples' Hospital	1929	100,000	50,000	To rebuild institution at Alton.
ARUNDEL and District Cottage Hospital	1930	8,000	6,300	Erection of a new cottage hospital.
BATH: Royal United Hospital	1929	100,000	62,000	Building of new hospital.
BEXHILL Hospital	1930	13,000	1,500	Building and equipment.
DONCASTER: Royal Infirmary and Dispensary	1925	156,000	110,000	Hospital and nurses' home.
EDINBURGH: Royal Infirmary	1930	500,000	154,000	New maternity and gynæcological wards with antenatal and out-patient departments.
EXMOUTH Hospital	1930	6,000	1,000	New children's and private wards; out-patient department; and X ray equipment.
GLASGOW: Victoria Infirmary	1930	105,000	61,377	Building and equipping auxiliary infirmary.
GLOUCESTER: Gloucestershire Royal Infirmary and Eye Institution	1929	20,000	12,500	Extension of wards and private beds, and out-patient department.
GOSPORT War Memorial Hospital	1930	15,000	9,400	Extension of administrative block and out-patient department, and increase of beds.
ILFORD: King George Hospital	1928	200,000	100,000	Conversion of emergency to general hospital, and extended accommodation.
INVERNESS: Northern Infirmary	1925	Increased to 140,000	120,000	Reconstruction and extension.
LONDON:				
Cancer Hospital (Free)	1928	150,000	22,000	Accommodation for paying patients and out-patients, and new radiological block.
City of London Hospital for Diseases of the Heart and Lungs	1928	26,000	14,000	Surgical and X ray blocks, sanitary improvements.
East London Hospital for Children	1925	30,000	5,000	Building a nurses' home.
Great Ormond-street Hospital for Sick Children	1930	Not announced.	42,000	Rebuilding hospital on present site and on land adjoining.
Hospital for Tropical Diseases	1929	35,000	12,500	Construction work and endowment fund.
Middlesex Hospital	1925	1,220,000	974,000	Reconstruction.
Queen Charlotte's Maternity Hospital	1927	Over 500,000	150,000	Wards for puerperal fever and maternity cases.
Queen Mary's Hospital for the East End	1930	35,000	Over 1,000	To pay off deficit on maintenance and building fund.
Royal Free Hospital	1928	600,000	425,000	Extension of V.D., pathological, obstetrical, and gynæcological departments; provision of private wards; and completion of nurses' home.
Royal London Ophthalmic Hospital	1930	24,000	4,000	Extension of out-patient department and laboratories, and new theatre.
St. Bartholomew's Hospital	1929	1,000,000	Not announced.	Surgical blocks and theatres; reconstruction of out-patients' department; maternity, gynæcological, and children's wards; research.
St. Mary's Hospital	1930	250,000	20,000	Paying wards; rebuilding medical school and nurses' home; extension of maternity wards.
St. Peter's Hospital for Stone	1928	24,000	13,000	Private beds; new out-patient department; reconstruction; and new pathological department.
Western Ophthalmic Hospital	1925	40,000	30,000	Rebuilding.
LOUGHBOROUGH and District Hospital	1928	40,000	33,400	New theatre; additional beds and maternity ward; reconstruction.
MANCHESTER: Ancoats Hospital	1928	100,000	36,000	Additional beds, theatres, and special services.
MANCHESTER Northern Hospital for Women and Children	1926	150,000	90,000	New general hospital.
MARGATE and District General Hospital	1926	70,000	60,000	New general hospital.
SOUTHEND and District New General Hospital	1926	145,000	115,000	To build new hospital.
WEMBLEY Hospital	1930	10,000	1,016	Hospital extension.
WORKSOP: Victoria Hospital	1930	12,000	4,800	Hospital extension.

PANEL AND CONTRACT PRACTICE

The New Essex Medical Service.

THE Essex Public Medical Service was started in 1924 to provide medical attendance on the families of insured persons on a contract basis. The last annual report shows that there were 16,750 subscribers and 127 doctors working it, the average payment per subscriber being 10*s*. 1*d*. Last June a proposal was made to extend the service so as to include patients whose incomes lie between £250 and £400, and the central committee have agreed in principle to the formation of the new service, using the existing office and staff for its administration. But the new service will not be controlled by the E.P.M.S.; it will be responsible for its own finances and administration. The chairman will be nominated, however, by the parent committee, the remaining members of the new committee being three doctors who are actually working the new service. The conditions now set forth are intended to serve for the first year or two, when experience may make it feasible to draw up more detailed rules and regulations.

The rate of payment is 30*s*. per annum for each member of the family, adult or child. If there are more than two children under 16 years of age in a family, the first two will pay 30*s*. each and the others 20*s*. each.

Thus a family of four (parents and two children) will pay £6 per annum—30*s*. per quarter—in advance. If no adult member of the family is on the book, the reduced rate for children above two in number will not apply. In the case of an exceptionally large family, the doctor may arrange with the office for special rates for children. Subscribers will have the option of paying direct to the office or to a collector of the E.P.M.S., who will call on agreed dates. A subscriber is entitled to benefit three weeks after acceptance by a doctor.

Administrative expenses are to be met as follows. A charge of 6*d*. per quarter is to be paid on each subscription book towards expenses of administration. The service will pay the E.P.M.S. £20 per annum for the use of the office (one-fourth of the expenses of rent, heating, lighting, cleaning, and telephone). It is estimated that at the end of about a year, after the first 500 families have joined the service, the cost of administration will be met by a deduction of 5 per cent. from the total collections. For the present it is proposed to deduct 20 per cent. from collections, which will be reduced to 15, 10, and 5 per cent. as the office income balances expenditure. Doctors who join the service after the 20 per cent. deduction has been reduced may be required to pay an entrance fee.

A subscriber to the service is entitled to receive from his medical attendant:

(*a*) Medical and surgical treatment within the competence and skill of a general practitioner at the surgery of his medical attendant.
(*b*) When his condition requires it, ordinary medical and surgical treatment at his place of dwelling.
(*c*) All needful medicines.

He is not entitled, in consideration of his ordinary subscription, to medical service in respect of:

(*a*) Confinements and miscarriages, or to illnesses arising therefrom within ten days.
(*b*) Vaccinations.
(*c*) Administration of a general anæsthetic.
(*d*) Certificates and reports.
(*e*) Such expensive drugs or preparations as may from time to time be determined by the Committee.
(*f*) Examinations, court attendances, &c., under common law, and workmen's compensation, employers' liability and other statutes.

The class of patient to be included is one specially hard hit by taxation, high cost of living, and the heavy expense of education; moreover, as trade gets worse, salaries are going down. It is the class which, in the majority of cases, is responsible for doctors' doubtful and bad debts. It is believed that the service will prove of considerable financial benefit to doctors. It will bring in the breadwinner of the family (who is ineligible for the panel) and the family will be regular patients, in good seasons as well as in bad. There will be no bad debts and no trouble of keeping and collecting accounts.

The advantages and conditions of the service, so far as they concern subscribers, will be made known to such patients as the doctor may wish to invite to join it by means of a printed circular letter, which includes a form to be filled in by the patient and sent to his doctor. Copies of this circular letter will be supplied to doctors for sending to their patients, or, if preferred, will be posted direct to patients from the office.

The office of the new Essex Medical Service is that of the E.P.M.S. at 108, City-road, London, E.C. 1. Secretary: Mr. H. E. Norton.

Recurring Difficulties of Panel Practice.

At a recent meeting of the Paddington Medical Society Dr. E. W. Selby, a divisional medical officer of the Ministry of Health, spoke of some of the difficulties of insurance practice. He reminded his hearers that the regional officers of the Ministry were doctors who had had themselves much experience of insurance practice, and should be regarded as sympathetic colleagues rather than as inspectors. Their routine visits to panel doctors were found to be of great value for exchanging opinions and clearing up difficulties. Friendly investigation of prescribing on these lines had reduced from 20 to 2 per cent. the number of cases in which doctors had to appear before their panel committee. Speaking of the forms of medical record, Dr. Selby suggested that entries were most easily made at the time the patient was seen; if this were always done it would be easy for the doctor to make out an adequate report when a case was referred to the regional officer, when it was most important for the report to be sent promptly, especially if the patient were ill in bed. The reports made by the regional officers were, he said, advisory in nature; they always tried to take into consideration any extenuating circumstances connected with the patient's disability. He went on to deal with certification in short illnesses and in post-operative debility, where there was a tendency for disability to be certified for an unduly lengthy period, and admitted the difficulties of cases with permanent partial disability. Discussion showed that many practitioners found the certification of cases of pregnancy and post-partum debility to present difficulties; some of these might be overcome by the exercise of tact, but others could be met only by alteration of the certification regulations. A number of members pointed out that patients attending hospital were apt to remain "unfit" longer than was actually necessary; this was due in some cases to the doctor not receiving a report on the patient from the hospital, and to the fact that the hospital

did not sufficiently appreciate the necessity of getting the patient back to work. Prolongation of "unfitness" was sometimes due to the patient not being able to resume work in his particular employment except on a certain day of the week. There was also the difficulty of the patient who, owing to age or permanent partial disability, had to find some other and easier occupation.

Medical Benefit in Northern Ireland.

Our Belfast correspondent tells us that the first meeting of the Medical Benefit Council for Northern Ireland has been held. The chairman, Prof. R. J. Johnstone, pointed out that although as far as the administration of medical benefit was concerned the duties of the Council were in the main advisory, yet in addition the Council had the important duty of acting as a court of appeal in specific cases concerning the services rendered by individual doctors and chemists. The Minister of Labour said that the medical benefit scheme was one for the alleviation of suffering and for the preservation of life. His ideal of the medical service to be given by doctors to their insured patients was the same care, skill, and treatment as was given to ordinary private patients. He stressed the point that insured patients were private patients, for all had the free choice of doctor, the only difference being that the insured patient contributed weekly towards the remuneration of the doctor. The chairman said that all were agreed that the Minister's high ideal of medical service would be the aim of the medical men on the panel in Northern Ireland.

PUBLIC HEALTH SERVICES

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are 1929 statistics of three counties:—

Name of county and estimated (R.-G.) mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant mortality.	Young child (1-5 yr.) mortality.	Maternal mortality from childbirth.
Kent .. .. (1,145,300)	15·3	12·7	0·82	1·54	2·3	2·5	61	29	3·5
Durham .. (940,900)	20·2	12·9	1·06	1·09	3·0	1·5	94	57	6·2
Staffordshire. (709,900)	18·4	12·8	0·83	1·27	3·1	2·0	79	—	4·5

Registered stillbirths per 100 live births: Kent 3·4, Durham —, Staffordshire 4·2.

Kent.

Dr. A. Greenwood reports that the number of deaths showed an increase of 1666 on the total of the previous year. Diphtheria was less prevalent. There were 1941 cases with 148 deaths—a high case-fatality of 7·6 per cent. From many of the districts came reports of failure to secure the early use of antitoxin. An outbreak of true typhoid occurred in Northfleet U.D. in November–December. There were 17 cases with 7 deaths. Investigation tended to implicate meats sold in a cooked condition, but bacteriological examinations were negative as regards the handlers of foods in the shops. At the end of the year the tuberculosis waiting-list was: 32 for sanatoriums, 78 for hospitals, and 36 for surgical institutions. The number of patients at Lenham Sanatorium receiving artificial pneumothorax treatment increases. The out-patients attending for refills also increase, and extra accommodation has had to be made. About 24 per cent. of the syphilitic patients and 13 per cent. of the gonorrhœa patients cease attendance at the clinics before completing treatment. These percentages are similar to those obtained in previous years.

The county scheme for crippled children continued to operate satisfactorily. The base hospital at Swanley for "long-stay" cases has 48 beds for tuberculous and 32 for other crippling ailments of Kent children. Hospitals at Maidstone, Canterbury, and Dartford provide for "short-stay" cases, and there are eight out-patient clinics at which massage, remedial exercises, and other forms of physiotherapy are carried out in a systematic manner, and at which instructions are given as to the carrying out of physical exercises daily at home. Many of these out-patients are supplied with surgical appliances which need repair and adjustment. Twelve outside complaints of tuberculous milk were received and as a result seven cows with tubercle of the udder were found and slaughtered, and one suffering from tuberculosis but with the udder unaffected was also slaughtered. Four of the district medical officers have arranged to send milk samples to the county laboratory to be examined for tubercle. The medical officers of districts also report condemned tuberculous carcasses in order that the herd of the farm from which they came may be inspected. An outbreak of food poisoning occurred at a social with 117 persons present. Within three-quarters of an hour of the serving of refreshments about 30 persons were taken ill. The cause appeared to be antimony in the enamel of the jugs in which the lemonade had been made.

The arrangements for hop-pickers' camps seem to improve every year. About 60,000 pickers come from London for a month, and the growers provide for these, but there may be an equal number of relatives and visitors especially at week-ends. Hence overcrowding! Improved portable latrines are gradually replacing the objectionable fixed type. It is difficult to provide cookhouses with safe fires at a reasonable cost, and many cases of burns and scalds are caused by the open gypsy fires. An improved arrangement for water-supply last year was the installation, in some cases, of cisterns with a number of spring anti-waste taps. These not only save wastage but abolish the evening queues of water drawers.

Some improvement in the housing situation is perhaps indicated by an increase in the numbers of houses found unfit for human habitation, of closing orders made, and of houses where defects were remedied. New houses also showed an increase. Nevertheless, Dr. Greenwood points out that nearly 6000 houses are required *now*. In September representatives of the Home Counties held a conference with respect to the deposit of London refuse. A resolution was passed that no local authority should be permitted to deposit refuse within the area of another authority without the approval of that authority and of its county council, with a right of appeal to the Minister of Health. Dr. Greenwood shows that there is a comic side to this question of refuse dumping. Last year Folkestone complained because Cheriton tipped its refuse within the borough, whilst Cheriton complained of a Folkestone dump of refuse within its boundaries.

Durham.

Dr. C. Franks presents the report as the information required was not available when his predecessor

Sir T. Eustace Hill retired. As the result of the influenza epidemic the death-rate in the first quarter was 16·5 and the infant mortality 120. There was much less small-pox. The notifications for 1927, 1928, and 1929 were: 5101, 1124, and 473, whilst the deaths were 19, 3, and 1 respectively. Although there was an increase in the number of new houses erected both by local authorities and by private enterprise, no appreciable difference has been made in the grave conditions of overcrowding, and many new houses are required to replace those unfit for human habitation. A new fixed minimum income scheme has been adopted for the blind. The number of blind persons on the register shows an increase of 279 to 1321, as the result of more accurate ascertainment. Under the new scheme an augmentation grant up to 20s. per week is made to every unemployable blind adult on the register. From April 15th to the end of the year the cost was £9470. On Dec. 21st, 1929, there were 275 urgent cases of mental defect awaiting institutional treatment. Plans for a colony for 1000 mental defectives at School Aycliffe near Darlington are under consideration. The new veterinary section is now in operation. The chief veterinary officer began work on April 1st and four assistants on Oct. 1st. Animals slaughtered under the Order were 237, of which 93 had tubercle of the udder, 3 were giving tuberculous milk, 42 had tuberculous emaciation, 97 had other tuberculous lesions, and 2 were not affected. Of 316 samples of milk taken by the Food and Drugs Acts inspectors 6·6 per cent. were found to be tuberculous.

There was a large reduction in the prevalence of diphtheria but the case-fatality increased from 5·2 to 5·5 per cent. The deaths from measles, 218, were higher than in any year since 1925 when the total reached 450. There were 131 notifications of ophthalmia neonatorum and in 13 cases permanent damage of one or both eyes occurred. It is believed that earlier hospital treatment would have prevented this permanent damage. The county council has purchased a house at Bishop Auckland for a combined centre for all their medical services, and the antenatal clinic of the County Maternity Home has been transferred to it. Special sessions are held at many centres for the expectant mothers, and at some centres the appointment system has been successfully adopted. Grants from the Coal Fields Distress Fund have been instrumental in sending mothers and babies to convalescent homes or to the seaside, and also in providing clothing and boots and extra nourishment for necessitous families. The families receiving extra nourishment from this fund at the end of the year numbered 1779.

The thorough biological and chemical survey of the River Tees is still in progress and likely to prove a source of valuable information for all river custodians. It is considered that of the three rivers of the county, the Tyne and the Tees, each belonging as they do to two counties, would be better looked after by Rivers Boards.

Staffordshire.

Dr. W. D. Carruthers gives the usual table with respect to the hydrographical survey of the River Trent. The analyses made in July and September show how the Trent is affected by the junction with its various tributaries in the county. A percentage of oxygen saturation below 65 means that the water cannot support fish life. The first analyses taken after the river leaves "the Potteries" are far below this figure of 65. The first improvement comes after the Sow flows in from the Stafford region, when the figures for oxygen saturation are 49·5 and 56·5. Self-purification then goes on, but receives a bad set-back from the junction with the Tame, and finally, as the river joins the Dove, on the border of the county, its water for the first time reaches the "fish life" standard with figures of 76 and 62 respectively for July and September. The new houses built were 3479 compared with 2488 for the previous year, but at the end of the year there were fewer houses in course of erection. There is still much overcrowding, and it is not possible to construct houses at an economic rent for a large section of the population.

Sixty-one outside complaints of tuberculous milk were received, and as a result 38 animals were slaughtered under the Order and 7 disposed of by the owners for slaughter. On the other hand, eight complaints of tuberculous milk were made to outside authorities and in six instances the investigations conducted had a negative result. Returns are given of the milk-sampling for the last 10 months of the year. Of 1238 ordinary milk samples 74, or 6 per cent., were tuberculous. Of 90 Grade A (T.T.) samples one was tuberculous, whilst of 561 Grade A samples 14 or 2·5 per cent. were tuberculous.

There were 40 notified cases of dysentery; 33 occurred in Cheadle R.D., of which 31 were patients at the Mental Hospital, and of these four died. The Joint Committee for Tuberculosis obtained a magistrate's order under Section 62 of the Public Health Act, 1925, for the compulsory removal of an advanced consumptive to a poor-law institution. The man in question had left hospital against medical advice and his habits made it essential that he should not remain at home. The order was made for a period of three months and renewed for a like period, during which the patient died.

The total births numbered 13,125. Of these, midwives attended 10,154 and sent for medical aid in 3154 (31 per cent.). The midwives also attended 1551 cases as maternity nurses. The number of births which were not attended by midwives was therefore 1420; the largest percentage of such births being in the northern sparsely-populated area of the county. Facilities are to be provided at every centre for antenatal and postnatal work, but it will be a considerable time, says Dr. Carruthers, before they are extensively used by the mothers.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED DEC. 13TH, 1930.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 137 (last week 95); scarlet fever, 2029; diphtheria, 1468; enteric fever, 26; pneumonia, 997; puerperal fever, 53; puerperal pyrexia, 111; cerebro-spinal fever, 11; acute poliomyelitis, 8; acute polioencephalitis, 3; encephalitis lethargica, 11; continued fever, 1; dysentery, 14; ophthalmia neonatorum, 84. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on Dec. 16th–17th was as follows: Small-pox, 189 under treatment, 5 under observation (last week 206 and 5 respectively); scarlet fever, 1869; diphtheria, 2122; enteric fever, 12; measles, 87; whooping-cough, 115; puerperal fever, 25 (plus 11 babies); encephalitis lethargica, 121; poliomyelitis, 1; "other diseases," 51. At St. Margaret's Hospital there were 16 babies (plus 7 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 1 (0) from enteric fever, 57 (0) from measles, 6 (0) from scarlet fever, 18 (2) from whooping-cough, 35 (3) from diphtheria, 49 (12) from diarrhœa and enteritis under two years, and 60 (9) from influenza. The figures in parentheses are those for London itself.

The fatal case of enteric fever was reported from Birmingham. Fifteen deaths from measles occurred at Hull, 11 at Liverpool, 4 each at Bristol and Swansea. Five deaths from diphtheria were reported from Birmingham and from Liverpool, 4 from Manchester, and 3 from Willesden. Diarrhœa accounted for 6 deaths at Birmingham, 3 each at Liverpool, Manchester, and Sunderland.

The number of stillbirths notified during the week was 286 (corresponding to a rate of 46 per 1000 births), including 51 in London.

DEATH *with* SMALL-POX.

A FATAL case provisionally assigned to small-pox in the return for the week ended Dec. 6th was that of an unvaccinated boy of 5. Dr. E. W. Caryl Thomas, medical officer of health for Dagenham U.D.C., tells us that as the result of two cases of small-pox occurring at the school the absentees were visited. Amongst these were the family D, which consisted of four members, Mr. D., Mrs. D., L. D., aged 7, and E. D., aged 5. Apart from Mr. D., who was vaccinated in the army, none of the family had been vaccinated. At the time of Dr. Thomas's visit on Nov. 27th, the elder boy, L. D., exhibited scars suggesting a recent attack of small-pox. E. D. had a number of scars and some scabs; the onset of his eruption was some four weeks previous. In addition, the mother was suffering, her onset being Nov. 9th. Just before the visit the family doctor had been called in to the boy E. D., who was complaining of sore-throat, and he notified him as suffering from diphtheria. As there were some scabs still on his body, he was removed to the L.C.C. small-pox hospital as a double infection, in preference to the local isolation hospital. The boy died some days after admission, the cause of death being certified as diphtheria.

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS.

UNEMPLOYED PERSONS AND HEALTH INSURANCE.

PROLONGATION PROPOSAL.

Mr. GREENWOOD (Minister of Health) in moving the second reading of the National Health Insurance (Prolongation of Insurance) Bill in the House of Commons on Dec. 17th, said that during the first period of unemployment after the war the Coalition Government decided that as the number of unemployed stood at 1,250,000 they would not permit people to suffer from the effects of prolonged unemployment, and they increased the benefits of the National Health Insurance Act. In 1921 the first Prolongation of Insurance Bill was passed and it was continued until 1928 when it was brought to an end. The question had now been reconsidered and in view of the fact that so many people were unemployed and would be excluded from benefit, he had now taken advantage of the powers given under the Act of 1928 to prolong by regulation the period of insurance for these people for a further year. Those powers, however, were now exhausted, and if the position was to be dealt with it could only be by fresh legislation. The situation to-day was even more urgent than it was in 1921. To-day, with old-age pensions, widows' pensions, orphans' allowances, as well as health insurance, it was infinitely more serious if a man's insurance rights were exhausted. Recent experience had shown that the persons who most needed benefit were those who had suffered longest from unemployment and were, in consequence, somewhat enfeebled by malnutrition. Therefore it had been decided to continue these people in their insurance rights.

A SUGGESTED DEPARTURE FROM PRINCIPLE.

It had been suggested, said Mr. Greenwood, that there might be in this Bill the beginning of some serious departure from insurance principle, that it was the start down the slippery slope which would end with the Health Insurance Fund being in deficit, and that a situation similar to that in regard to unemployment would arise. That was the wildest possible exaggeration. The Government were really maintaining the insurance principle. The only point was that instead of the person paying his contribution for himself the Government were going to pay it for him. The approved societies could not be asked to bear this burden. It was impossible to say exactly how many people were affected by the Bill; they were persons who had not done any work for two and a half years or more. The number would probably be about 80,000. The cost would be between £80,000 and £130,000, say roughly £100,000. In addition, it was proposed to pay the State contributions as would have been the case if those persons were paying their own contributions, and that would cost between £14,000 and £24,000.

THE PRINCIPLE DISCUSSED.

Sir KINGSLEY WOOD said that this question had been interesting the approved societies for many months, and they had pressed the Minister of Health on it. The scheme did not affect a very large number of people. There was no proposal in the Bill to continue full insurance benefits; most of the benefits would be at only half rate. The maximum cash amount an insured man could get was 7*s.* 6*d.* per week, and in the case of a woman 6*s.* They might receive very much less, something like 3*s.* 9*d.* per week in each case. The principle hitherto followed by friendly societies and approved societies was that when an insured person was unfortunately not able to keep up his contributions his benefits must cease. That principle was being departed from in this Bill, and he asked whether it was the intention to pursue the same path in regard to health insurance as they had already pursued in regard to unemployment insurance. If they once admitted the principle that the State should pay the contributions of certain people who had fallen out of insurance benefit then there were other classes of insured people who would ask that their claims should also be considered.

THE BILL ACCEPTED.

After further debate,

Mr. GREENWOOD assured the House that before another year the Government would be in a position to make definite constructive suggestions for dealing with this problem.

Sir KINGSLEY WOOD said that in view of Mr. Greenwood's undertaking that there should be further inquiry into this matter, the opposition would not offer any objection to the remaining stages of the Bill.

The Bill was read a second time and passed through all its remaining stages.

In the House of Lords on Dec. 18th the National Health Insurance (Prolongation of Insurance) Bill passed through all its stages.

VIVISECTION EXPERIMENTS.

Lieut.-Commander KENWORTHY, in the House of Commons on Dec. 16th, asked leave to bring in a Bill to prevent the application of public money to vivisection experiments. He said that the British Medical Association had been good enough to send him, and he dared say to every other Member of the House, a document in reference to the Bill asking for it to be opposed, and the ordinary reading of that document would make it appear that he (Commander Kenworthy) wished to prevent those vivisection experiments. He might wish to do so, but it was not intended to prevent them by this Bill. There was a very wide objection to the taxpayers' and ratepayers' money to the extent of £130,000 or £145,000 a year being devoted to subsidising these experiments. If they were to go on there were many wealthy institutions which could continue to support them. There had been a tremendous increase in the number of these experiments and he did not think that that increase could possibly be warranted by the results. In 1927 there took place 13,871 cutting operations with anæsthetics, and 279,431 experiments

without anæsthetics—a total in 1927 of 293,302. In 1928 the figure had risen to 315,891, and in 1929 to 403,142—an increase of 87,250 in 12 months. That was unjustified and led to a great deal of unnecessary expenditure. In 1929 there were 513 animals, including cast Army horses, exterminated by poison gas experiments, all paid for by the taxpayers' money against the conscience and desire of a large majority of people in the country. This Bill was introduced in 1922 and 1924 and he was supported then by the present Secretary of State for Scotland, the present Home Secretary, the present Foreign Secretary, the present Secretary of State for War, and the present Secretary for the Dominions. The Bill consisted of only three clauses and was backed by Members of all three parties.

OPPOSITION TO THE BILL.

Major CHURCH, in opposing the Bill, said that very few Members of the House would be reluctant to have a full discussion on this very interesting and important subject if there was time for it. But since that was not possible in the circumstances he must, on behalf of the Medical Research Council, on which body he had the honour to represent that House, oppose the Bill, not because he believed in giving unnecessary pain to animals. There were very few in that House who would like to see the slightest harm done to any of the smaller creatures. There were very few who would view with anything but a feeling of misgiving any experiment clumsily carried out on any animal, whether for the purpose of curing it of a disease, or in the course of experiment on the animal with the object of saving human life. A great deal of sentiment was naturally brought to bear on a subject of this kind; but they had not merely to consider sentiment, they had to take into account the advance of knowledge and the uses to which animal experiments were put for the purpose not merely of saving human life, but also of saving the lives of animals. He would remind Lieut.-Commander Kenworthy that it would be extremely difficult to differentiate between money spent directly by the State in State research institutions, such as the National Institute for Medical Research at Hampstead, and similar places, and that which was granted for universities and other research bodies in the country carrying out experiments on animals. He also pleaded with the House to use some common-sense with regard to the figures which had been quoted by his hon. and gallant friend. They should realise that the greater number of those experiments were experiments in which there was not the slightest suspicion of pain being inflicted on the animals, in which there was neither anæsthetic used or necessary. A large number of those experiments were carried out on mice, rats, guinea-pigs, and animals of that kind for the purpose of testing the various diets which were afterwards standardised for the cure of certain specific diseases among children—rickets for example. A cure for rickets was established by experiments on animals. Every one of such experiments had to be tabled as experiments and had to be done under licence from the Home Secretary. Under the Bill these feeding experiments would be excluded. Many friends of his at the present time were engaged in a whole series of experiments on mice and rats, hedge-hogs, and other similar animals for the purpose of carrying out certain tests with regard to pituitary and other glandular extracts. Those experiments were of the simplest possible kind, and consisted of the injection by hypodermic syringe at certain times of certain substances. Experiments of that nature were well within the ambit of this Bill. He reminded the House that experiments of a serious nature were only allowed under regulations and only under the most stringent conditions were animals allowed to live after serious experiments had been carried out on them. In all other cases the animals were destroyed. The experiments were carried out under an anæsthetic.

LEAVE REFUSED.

On a division, leave to bring in the Bill was refused by 170 votes to 156—majority against, 14.

TREATMENT OF VAGRANTS.

In the House of Lords on Dec. 10th the Bishop of EXETER asked the Government what steps had been taken to secure more uniform and humane treatment of vagrants, and especially whether any steps had been taken to found any institutions to train juvenile vagrants; also whether public assistance committees had any power to make grants towards the maintenance of existing institutions for the reclamation and training of young vagrants; and moved for Papers. He said that they were very grateful for the Vagrancy Report, which had been rightly called the Casuals' Charter. He was, however, somewhat alarmed lest that report might remain only an aspiration and not come to be a reality. He was anxious that if any forward step was taken they should be certain that similar steps would be taken in every part of the country. They were very grateful for Dr. Lewis's report. It was the first time that they had really reliable data as to who the tramps were. Hitherto the popular idea had been that tramps consisted of people who would not work, and people who wanted work and could not find it. Those who had worked among them knew that there was a very large section who should rather be included under the term "cannot work." Dr. Lewis brought that fact out. The figures were very remarkable. He asserted with all his knowledge that a quarter of the tramps in the country were what were usually termed "mentals." Some were insane, a very large section were feeble-minded, and a good number had psychoneurosis. It altered the whole picture when one remembered that these poor feeble-minded creatures were being allowed to wander about the country to look for work which did not exist, and which, if they found it, they could not do. Surely no one could commend a system which had that for its result.

THE CASUAL WARD.

The criticism he would offer was the assumption that the casual ward was to continue, for those who were employable would find it less helpful to get employment than it used to be. He agreed that that section was a small one. Dr. Lewis suggested that 80 per cent. were habitually users of the casual ward. Probably that 80 per cent. were more or less unemployable, but the 20 per cent. who were employable would find that the regulations advised in the report would make it harder for them to find work. In the first place, the casual wards were to be 15 miles apart. How could a man after tramping 15 miles look for work? There was a section who could be reclaimed—namely, those who were in the casual wards through drink. Dr. Lewis put the proportion as one in eight. They could not save these men merely by giving them short terms of imprisonment. He would like to see an alteration made in the law enabling men voluntarily to enlist in homes which it was hoped the counties would set up, and that voluntary enlistment should be binding on them for a definite time. Dr. Lewis pointed out that the intellect of these feeble-minded tramps was that of an ordinary boy of seven or eight years. Could they trust children of seven or eight to act sensibly without some discipline? These homes should not be regarded as prisons; he would much rather they were looked upon as hospitals or schools. Many of those who were feeble-minded could become quite useful citizens if they were properly trained, but there must be power to train them. He had visited one of these detention colonies in Switzerland, which had much impressed him. The men in it were there by sentence of a court.

The Bishop of ST. EDMUNDSBURY AND IPSWICH said the problem of dealing with vagrants was a

very difficult one. He believed that those tramps whose mental capacity was not up to a fair average formed quite a small proportion of the number of vagrants, and unemployment had very little to do with the question. If they made inquiry they would find that the number of vagrants at present was no larger and in some parts very much smaller than it was before the war. They could not deal with this question at all without discriminating very carefully between the relatively small minority in respect of whom there was a real chance of doing something in the directions to which the Bishop of Exeter had alluded, and the very much larger proportion who certainly would not be dealt with satisfactorily by any of those methods. The first main factor in the making of vagrants was that most of them liked the life. They got sufficient food and shelter, because a certain number of people gave them what they wanted without any real inquiry into their circumstances or their needs. He did not think it was too much to say that among the persons who came before a public body as vagrants there was not more than 1 in 500 to whom help could effectually be given. There were only two main lines of remedy. The first was to direct public attention to the matter, and secondly to persuade the public that they might really leave vagrants to the care of the authorities or of voluntary bodies trained and equipped to deal with them effectually, and that alms personally given did harm and not good. But, of course, it was extraordinarily difficult to do this. To have institutions up and down the country to receive these tramps was not really going to be helpful. The kind of person likely to commit himself to the care of an institution of that sort for an indefinite time under discipline was very rare indeed

"INFAMOUS AND INTOLERABLE" CONDITIONS.

The Bishop of SOUTHWARK said it was stated in the report that "in a certain number of casual wards the conditions now existing are infamous and intolerable." Those were very strong words, and they were all the stronger because the report throughout was so restrained in its language. It was surely impossible to allow these conditions to continue without immediate action. It was stated in the report that out of 592 casuals examined 93 were found to be mentally defective, 32 were insane, and 34 were suffering from some form of psychoneurosis. If this proportion was applied to the 12,000 casuals to be found in the casual wards and on the roads on any one night, something like 1800 people among them were mentally defective, 600 were insane, and 600 others were suffering from some kind of mental defect. The committee reported that it was quite convinced that there was an appreciable number of casuals who were certifiable under the Lunacy Acts. The committee recommended that the officer in charge of the wards should report to the authorities any case in which there appeared to be some mental illness, and further that the medical officer of health should, at least once a month, pay an unexpected visit to the casual ward and medically inspect its inmates to see whether any of them were suffering from mental illness. That recommendation could be carried out without legislation, and he was anxious to know if any definite steps had been taken in that respect. He was also anxious to know what steps were being taken to coördinate the different areas dealing with this problem. Great emphasis was laid throughout the report on the fact that usually one found ineffective administration when the unit of administration was small, and good administration when the area of administration was large.

GOVERNMENT'S REPLY.

Lord MARLEY (Under Secretary for War), replying on behalf of the Government, said that the Minister of Health had been very much concerned with the Vagrancy Report, and he felt compelled to obtain the names of the particular wards pilloried as being "infamous and intolerable." The Minister had taken immediate action to secure improvement in those particular wards. On August 13th of this year the Minister issued a circular to all county councils, county boroughs, and joint vagrancy committees, and with it he enclosed a copy of the Vagrancy Report. In the circular the Minister called attention to Part IV. of the report, in which a judgment was expressed as to the badness of the conditions now prevailing in certain casual wards, which the Minister had noted with the deepest concern and regret. He was confident that the new authorities would agree with him that no branch of public administration ought to be allowed to consider itself liable to such reproaches, and he hoped immediate and vigorous steps would be taken for a general overhaul of casual ward arrangements so that decent and seemly provision might be made everywhere for the accommodation of casuals. The circular went on to say that the Minister had instructed the general inspectors to coöperate closely with local authorities and to keep the Ministry of Health informed of progress in securing the needed improvements; and the Minister had it in mind in the autumn to detail an officer or officers for special work in this matter. There were 12 general inspectors, including a chief inspector, now engaged in this work, and there were also four special assistant inspectors. Since the issue of the circular the Minister had learned with very great satisfaction that many councils and joint vagrancy committees had themselves undertaken an examination of the wards, and had set about the work of improving the conditions found to be unsatisfactory. In regard to the number of joint vagrancy committees, 18 such combinations had already been created by statutory orders, and 43 administrative counties and 67 county boroughs had been combined into those 18 joint vagrancy committees. Proposals were now being considered for five more joint vagrancy committees, which would include 11 additional administrative counties and 16 county boroughs. The Minister of Health had in draft a new Order which would regulate the relief of casuals and would embody such recommendations of the Vagrancy Report as could be made effective by means of an Order. With this Order the Minister of Health intended to issue a circular drawing attention to such other recommendations in the report as could not be dealt with suitably by regulation. The new Order would be issued in a very few days. All vagrancy committees constituted by the grouping of counties and county boroughs had power to contribute by annual subscription towards the support and maintenance of any institution which appeared to them calculated to render useful aid in the administration of relief of casuals. Under this head they could, by way of subscription, encourage the formation of training homes for casuals and others. He thought it would be better to segregate mental defectives in homes where they could be dealt with from an educational point of view.

The Bishop of EXETER withdrew his motion for Papers.

PHARMACY AND POISONS BILL.

In the House of Lords on Dec. 17th Lord MARLEY introduced the Pharmacy and Poisons Bill, which was read a first time.

THE CHRISTMAS ADJOURNMENT.

Both Houses of Parliament adjourned on Friday, Dec. 19th, for the Christmas recess, until Jan. 20th. In the House of Lords the Royal Assent was given to a number of Acts, including the National Health Insurance (Prolongation of Insurance) Act.

HOUSE OF COMMONS.

MONDAY, DEC. 15TH.

Pulmonary Tuberculosis and Disablement Pensions.

Dr. MORRIS-JONES asked the Minister of Pensions whether he was aware that in certain cases of pulmonary tuberculosis, although there might be extensive physical signs in the chest, a decision had been given that this did not necessarily indicate a high degree of disablement; that the presence of tubercle bacilli in the sputum did not mean that the man was totally disabled; that pensioners suffering from tubercular disease of the lungs were cut down in their assessments when it was found they were at work; and whether this had been done on the instructions of his department.—Mr. ROBERTS replied: The hon. Member would appear to have been misinformed as to the tenor of the Ministry's medical instructions. Assessment of pension is based on the degree of physical loss or incapacity sustained by an officer or a man in consequence of a particular injury or disease, not merely on the clinical signs present in the case. The statements referred to in the first two parts of the question, while conveying an obvious application of this principle, are far from adequately representing the principles on which medical officers of the Ministry work. With regard to the statement in the third paragraph of the question, it is never the case that an assessment is reduced simply because the man is at work, though the extent, if any, to which the man has shown himself capable of regular work is necessarily some evidence of incapacity.

WEDNESDAY, DEC. 17TH.

The Government and Factory Legislation.

Mr. MANDER asked the Home Secretary when it was proposed to introduce the Factories Bill.—Mr. CLYNES replied: I regret I am not in a position to make any statement on this point.

Prison Administration.

Dr. PHILLIPS asked the Home Secretary whether he had had under consideration the appointment of a departmental committee to investigate the administration of prisons; and, if so, whether he proposed to set up such a committee.—Mr. CLYNES replied: I propose to set up at an early date a committee to investigate the problem of persistent offenders who return to prison repeatedly, and pending the result of this investigation it would not be desirable to appoint a committee of inquiry into other aspects of the prison question.

Capital Punishment.

Mr. HACKING asked the Home Secretary what action he proposed to take in connexion with the report from the Select Committee on Capital Punishment.—Mr. CLYNES replied: Before I can make any statement on a subject of such vital importance I must have time to consider the report in all its bearings and all the issues involved.

Sterilisation of the Mentally Unfit.

Mr. SORENSEN asked the Minister of Health whether he had considered resolutions requesting the appointment of an inquiry into sterilisation in relation to the mentally unfit; how many local authorities had endorsed these resolutions; and what he proposed to do in the matter.—Mr. GREENWOOD replied: Twenty-one local authorities have endorsed resolutions in favour of an investigation of this kind; but, as I explained in reply to a question on Nov. 27th, the issue is not one which can suitably be made the subject of a separate inquiry.

Infected Mutton from South America.

Mr. THORNE asked the Minister of Health if he was aware that considerable quantities of imported mutton and lamb from the Argentine Republic and Chili were infected with caseous lymphadenitis, and were escaping inspection at the ports and reaching butchers' shops, and that in order to evade inspection quantities of legs, shoulders, sides, saddles, and other parts, cut from diseased carcasses, were being imported; and if he would take steps to prohibit the importation of mutton from these countries other than in carcass, and order a more rigid examination of all imports, and insist that the work of cutting the glands was carried out by skilled butchers.—Mr. GREENWOOD replied: I am aware that caseous lymphadenitis is found in a certain proportion of carcasses of mutton and lamb imported from the countries referred to. The normal practice is to make a preliminary examination at the port of 10 per cent. of each consignment of whole carcasses, and to examine the remaining 90 per cent. either at the port or elsewhere if the result of the preliminary examination shows this to be desirable. I do not think it necessary to recommend any modification of this practice. At a conference recently held between medical officers of the ports principally concerned and officers of my Department it was decided that imports of mutton and lamb from South American countries should receive special attention, and that severed parts of carcasses should in all cases be given complete examination. I am considering whether any further conditions should be laid down in connexion with the importation of severed parts of carcasses. I understand that the work of cutting the glands is at all ports entrusted to persons who have experience of the work, and I do not think it necessary to make any special recommendation on this point.

Cheese Wrapped in Tinfoil.

Major GEORGE DAVIES asked the Minister of Health whether his attention had been drawn to a special investigation, made by the medical officer of health to the Lambeth Borough Council, into the possibilities of tin poisoning from cheese wrapped in tinfoil, the analyst reporting that the result of his investigation indicated that cheese so prepared in this country could be regarded as perfectly safe for human consumption; and whether he would take all steps to relieve public anxiety on the matter.—Mr. GREENWOOD replied: I have received a communication from the Lambeth Borough Council enclosing a report in which the medical officer of health makes the statement referred to. Some samples of cheese prepared in this country have been found to be unduly contaminated by the tinfoil in which they were wrapped, but I understand that the industry is aware of the importance of reducing the extent of the contamination to the lowest possible limit, and is making efforts to achieve this end. In the meantime I am keeping the matter under observation, but I do not think it necessary at present to make any further statement.

A National Maternity Service.

Viscountess ASTOR asked the Minister of Health whether it was intended to introduce legislation making provision for a national maternity service.—Mr. GREENWOOD replied: I am sending the noble lady a copy of a circular and memorandum which I have recently issued to local authorities on the subject of maternal mortality. As stated in the circular, the Government have decided to undertake negotiations with the various authorities concerned with a view to formulating a scheme on a national basis for the care of maternity. Such negotiations are a necessary preliminary to the introduction of legislation for this purpose.

Lieut.-Colonel FREMANTLE asked the Minister of Health if, before any scheme for a national maternity service was formulated, he would confer with the midwives through the Incorporated Midwives' Institute and the Queen's Institute of District Nursing, as the respective bodies mainly representing and employing them, as well as with bodies representing the medical profession and other interests concerned.—Mr. GREENWOOD replied: I will consider the suggestions made by the hon. and gallant Member.

Wandle Valley Hospital Accommodation.

Mr. MILLS asked the Minister of Health if he was now in a position to sanction the Wandle Valley hospital construction, Surrey.—Mr. GREENWOOD replied: I have directed a public inquiry to be held into the application in question. I shall not be in a position to give my decision on the application until I have considered the report on the inquiry, but there will be no avoidable delay.

Sulphur Dioxide in Fruit Pulp.

Viscount ELMLEY asked the Minister of Agriculture (1) when he would introduce legislation amending the part of the Merchandise Marks Act relating to the amount of sulphur dioxide permissible in imported pulped fruit, and (2) if he would make an order to compel jam manufacturers to label their products to show whether they were made of preserved fruit.—Dr. ADDISON replied: The regulation of preservatives in foodstuffs is provided for under the Public Health Acts, under which it would be impossible to discriminate between imported and home products. I am, however, carefully considering whether, and in what way, steps can be taken to indicate to the consumer that the jam he is purchasing is, or is not, made entirely from home-grown fruit.

Extension of Westminster Hospital.

Lieut.-Colonel FREMANTLE asked the First Commissioner of Works if, in view of the necessity of the Westminster Hospital concentrating outlying departments and extending on the adjacent site now occupied by the Stationery Office, he would consider helping Parliament to act in support of its local hospital by assisting it to acquire the site of the Stationery Office on easy terms, partly in exchange for outlying sites and leases now held by the hospital.—Mr. LANSBURY replied: I regret that it is not possible for me to assist the Westminster Hospital in the manner suggested.

Volunteers and Poison Gas Experiments.

Mr. FREEMAN asked the Secretary for War the number of volunteers who had submitted to poison gas experiments; and what fund, if any, existed to compensate them in case of accident or injury or their dependents in case of death.—Mr. T. SHAW replied: Since Jan. 1st, 1929, some 520 volunteers have undergone tests with the object of proving the efficacy of preventive and curative treatment for skin burns and of confirming the adequacy of the protection afforded by respirators. Many of these volunteers have undergone more than one test. Every care is taken to ensure that the test involves no risk to the health of the volunteers, but, if an injury was sustained, it would be dealt with as attributable to the Service, and such compensation would be paid from Army funds as the ordinary regulations provide.

Prevention of Influenza.

Mr. LOUIS SMITH asked the Home Secretary whether, in view of the sanction he had given to by-laws enabling municipalities to prohibit the attendance of children at places of entertainment when there was local influenza, he could state how he proposed to define the term influenza.—Mr. CLYNES replied: I am not aware that any by-laws have been made on this subject. The hon. Member may be referring to a condition that may be attached by a licensing authority to the grant of a licence under the Cinematograph Act, 1909. I understand that a number of such licensing authorities have made it their practice to attach a condition designed to exclude children from premises licensed under the Act during an epidemic of infectious disease. But these conditions do not require my sanction, and any question regarding their validity or interpretation is a matter for the courts.

FRIDAY, DEC. 19TH.

Purity of Agricultural Produce.

Brigadier-General CLIFTON-BROWN asked the Minister of Health whether, in order to improve the position of home-grown agricultural produce on the home market, he would take steps to ensure that imported food, milk, and other dairy produce were subject to regulations concerning quality and purity similar to those enforced in the case of home produce.—Mr. GREENWOOD replied: Regulations concerning the quality and purity of food are made on public health grounds or otherwise to protect the interests of the consumer. In general, therefore, home-produced and imported foods are subject to the same requirements. In many respects the actual control of imported foods is the stricter since these articles are subject to inspection at the time of importation as well as at the time of exposure for sale. As regards imported milk, the quantity of which is insignificant, it would not be practicable to enforce the detailed requirements of the Milk and Dairies Order, and in lieu thereof a strict bacteriological condition is imposed which does not apply to home-produced milk.

Post-vaccinal Encephalitis.

Mr. FREEMAN asked the Minister of Health how many of the 97 deaths from post-vaccinal encephalitis, referred to on page 73 of the annual report of the chief medical officer for 1929, appeared in the annual statistical reviews of the Registrar-General as caused by vaccination.—Mr. GREENWOOD replied: Of the 97 deaths in question 30 have been classified to vaccinia, and have appeared under that heading in the annual statistical reviews of the Registrar-General.

Mr. FREEMAN asked the Minister of Health whether, in view of the continued occurrence of deaths from post-vaccinal encephalitis after the use of Government lymph extracted from the vesicles of rabbits, he would consider the desirability of dispensing with the use of these animals in connexion with the preparation of the Government lymph supplies.—Mr. GREENWOOD replied: This question has been fully considered, but as I am advised that there is no evidence that post-vaccinal encephalitis is attributable to the use of rabbits in connexion with the preparation of lymph, I do not consider that any change in the present practice of the Government lymph establishment is necessary.

MEDICAL NEWS

University of Oxford.

On Dec. 17th the following degrees were conferred:—

D.M.—R. S. Creed and E. B. Strauss.

B.M.—Anne D. M. Adams, F. R. Crookes, H. R. J. Donald, H. C. Harley, R. S. Harrison, M. A. Hatt, J. M. Lees, Q. St. L. Myles, N. C. Parfit, and F. M. Trefusis.

University of Cambridge.

On Dec. 19th the following degrees were conferred:—

M.B. & B.Chir.—D. W. Bawtree, A. T. Curnow, and W. R. H. Pooler.

M.B.—S. E. F. Gooding and W. E. Mashiter.

B.Chir.—D. G. Macdonald and F. G. Booker.

University of Birmingham.

On Dec. 19th the following degrees were conferred:—

M.D.—Felix Smith.

M.B. & Ch.B.—R. H. Fooks, C. E. Moorhead, and J. V. Walker.

L.D.S.—R. H. Allen, R. A. Cohen, Flora M. Grant, R. C. Lewis, R. E. Marlow, H. E. Munro, and Queenie A. L. Whitmore.

University of Liverpool.

At recent examinations the following candidates were successful:—

M.CH. ORTH.

A. C. Armstrong, J. C. Drummond, L. W. N. Gibson, M. K. Hussein, P. Roux, and V. J. M. Taylor.

M.D.

G. S. Clouston, T. B. Davie, J. H. Follows, J. Hatton, D. E. P. Pritchard, J. E. Wallace, and Kathleen M. Ward.

FINAL EXAMINATION FOR M.B. AND CH.B.

Part A (1924 Regulations).—F. C. Angior, Mary F. Lacey, F. T. B. Lovegrove, and D. I. A. Williams.

(*In individual subjects only*).—G. R. Critien, D. J. Hoskingson, C. Y. Howarth, and Beatrice L. H. Sergeant.

Part B.—*C. G. Burgess, J. M. Erskine-Young, and H. E. C. Sutton.

* Distinction in Surgery.

Part I (1923 Regulations).—R. Fairhurst.

Part III.—H. F. Cohen, F. J. H. Crawford, A. Gardner, Teresa Lightbound, and V. T. Parkinson.

DIPLOMA IN TROPICAL MEDICINE.

K. N. Bagchi, L. B. Bier, J. Caplan, D. S. Chowdhary, T. H. Davey, L. M. Ghosh, F. Hawking, L. J. A. Loewenthal, D. McElwee, J. B. MacKie, Y. B. Mangrulkar, W-K. Miau, H. W. Mulligan, F. O'Driscoll, M. Singh, J. K. Sung, G. Verghese, J. L. A. Webster, and J. Willoughby.

University of London.

The title of Emeritus Professor of Fine Art in the University has been conferred on Mr. Henry Tonks, F.R.C.S., on his retirement from the Slade Chair of Fine Art at University College.

The degree of D.Sc. has been conferred on Mr. G. F. Marrian (in biochemistry) and Mr. Philip Eggleton (in physiology).

On the recommendation of the Board of Management of the London School of Hygiene and Tropical Medicine, Sir George Newman has been appointed Heath Clark lecturer for 1931.

Royal College of Surgeons of Edinburgh.

At a meeting of the College on Dec. 17th, with Dr. J. Haig Ferguson in the chair, the following 30 successful candidates (out of 95 entered) who passed the requisite examinations between Sept. 29th and Oct. 7th, were admitted to the Fellowship:—

Philip Jacob Alpers, Sheikh Amir-ud-Din, Ahmad El-Sayed Ali Ammar, Thomas Cecil Baker, Diana Jean Kinloch Beck, Evert Frederick Birkenstock, William Mark Brown, Alfred Rainald Keith Burne, William John Anson Coldstream, James Cook, George Harvie Duncan, Harry Medcalf Fisher, Ian Comyn Fraser, Phillip Gibbin, Laurence Samuel Henry, Bruce Ernest Lawrence, Daniel Richard Lewis, William Laurence Macdonald, Hamish Grant McPherson, Alexander Mayne Martell, Alexander Smith Morton, James Duncan Murdoch, Thomas Alexander Ogilvie, Doddaballapur Hari Rao, Walter Ogilvy Reid, Kiranla Sen, Tarachand Dayasing Shahani, Robert Sharpe Venters Bryan Williams, and Thomas Isaac Williams.

Fulham Power Station Inquiry.

At an inquiry which is being held by the Electricity Commissioners into the application of the Fulham Borough Council for consent to extend their generating station in Townmead-road, Mr. J. H. Ryder, consulting engineer to the Council, described apparatus for the elimination of sulphur fumes by the treatment of flue gases with water, and said he believed it was possible to eliminate sulphur from the gases at Fulham. Evidence was given by Sir Frank Baines of the increasing damage to public buildings in London due to smoke pollution in the past few years. Dr. F. Barrie Lambert, on behalf of the L.C.C. Public Health Committee, said that when the Council in 1927 withdrew its opposition to the Battersea proposal it had not a full appreciation of the possible danger from sulphur fumes. The danger of mass production was not then considered. Mr. J. E. Singleton,

K.C., in opening opposition on behalf of the L.C.C., and three associated councils, said that no one doubted the existence of danger to health and buildings if there was further pollution of the atmosphere. At Battersea there had been a great advance in preventing the evolution of oxides of sulphur, and he asked for an opportunity of seeing these tests in operation before leave was granted for extension at Fulham. Dr. J. S. Owens, speaking for the Department of Scientific and Industrial Research, said that in the presence of sulphuric acid particles fog was formed at a lower relative humidity; the smaller the particles the more effective they were in producing fog. He went on to consider the possible risk from inversion of the usual sequence of air temperature. Normally this fell as one went from the ground upwards, but there was always inversion over the top of a fog which increased the likelihood of flue gases sinking to the ground, and inversion increased this danger. If the whole of the flue gases from the proposed station settled down over an area (say) of a square mile, they would cover it to a depth of 30 feet. On behalf of the L.C.C. Mr. Trevor Watson, K.C., stated the conditions which the Council thought should be imposed if the application were granted, the first of these being that the sulphur content of the effluent gases should not exceed gr. 0·02 per cubic foot. Mr. J. A. Robertson, consulting engineer, said that a small number of stations spread over a large city did not in his opinion cause so much damage through sulphur dioxide as one big station, but he believed the solution of the problem of eliminating sulphur fumes was nearer than many people thought. Dr. W. Allen Daley, principal medical officer to the L.C.C. General Public Health Branch, said that the poor people in the vicinity of the proposed power station would continue to use coal fires unless electricity was particularly cheap. He regarded as satisfactory a limitation of SO_2 in the atmosphere to gr. 0·02 per cubic foot. Mr. Tyldesley Jones, K.C., for the Fulham Borough Council, remarked that wherever the station was put the sulphur nuisance must be prevented. The Fulham Council had adopted the Modave purifying plant which they believed to be still further capable of improvement, but should it be found unsatisfactory it could be scrapped. Everything which could reduce the domestic coal consumption would tend to mitigate the mischief of smoke pollution. The L.C.C., he remarked, was having to extend the boiler capacity of its Greenwich station regardless of the consequences in the matter of sulphur content. The public inquiry closed on Dec. 20th.

Instruction for D.P.H.

A three-months' course of lectures and demonstrations on Clinical Practice and in Hospital Administration will be given at the North-Eastern Hospital, St. Ann's-road, Tottenham, by Dr. F. H. Thomson, the medical superintendent, on Mondays and Wednesdays at 4.45 P.M. and alternate Saturdays at 11 A.M., from Jan. 5th. Application should be made to the Medical Officer of Health, London County Council, Public Health Department (Special Hospitals), Victoria Embankment, E.C. 4.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL, Gray's Inn-road, W.C.

FRIDAY, Jan. 2nd, 1931.—4 P.M., Mr. J. D. McLaggan: Atrophic Rhinitis.

Appointments

HAINWORTH, E. M., M.D. Lond., F.R.C.S. Eng., has been appointed a Medical Referee under the Workmen's Compensation Act for the Districts of the Beverley, Bridlington, Goole, Great Driffield, Kingston-upon-Hull, Pocklington, and Selby County Courts.

Royal United Hospital, Bath: KINDERSLEY, C. E., F.R.C.S. Eng., Surgeon, and MITCHELL, D. A., M.D. Lond., F.R.C.S. Edin., Surgeon in charge of the Gynæcological Department.

Cardiff Royal Infirmary: WADE, J. O. D., M.S. Lond., F.R.C.S. Eng., and HARRIES, D. J., M.D., B.S. Lond., F.R.C.S. Eng., Honorary Surgeons.

Certifying Surgeons under the Factory and Workshop Acts: BARBER, G. O., L.R.C.P. Lond., M.R.C.S. (Dunmow); DAVIS, E. C., M.B., Ch.B. Edin. (Llandyssul, Cardigan); and CARMICHAEL, R. McL., M.B., Ch.B. Glasg. (New Tredegar, Mon.).

Vacancies

For further information refer to the advertisement columns.

Brighton, Royal Sussex County Hospital.—H.S. £150.

Burnley, Victoria Hospital.—Two H.S.'s. Each at rate of £150.

Bury St. Edmunds, West Suffolk General Hospital.—Jun. Res. M.O. £150.

Chesterfield and North Derbyshire Royal Hospital.—H.S.'s. All at rate of £100–£175.

Dumfries, Crichton Royal Mental Hospital.—Locum Tenens Clin. Pathologist. 7 gns. weekly.

Dunedin, New Zealand, Otago Hospital Board.—Radio-Therapeutist. £1000.

Finsbury Borough Council.—Asst. M.O.H. £750.

Hertford County Hospital.—Hon. Asst. Surg. Also H.P. At rate of £150.

Hospital of St. John and St. Elizabeth, 60, Grove End-road, St. John's Wood, N.W.—Radiologist.

Hospital for Sick Children, Great Ormond-street, W.C.—Part-time Jun. Cas. O. At rate of £150.

Hull Royal Infirmary, Sutton Branch.—H.P. At rate of £160.

Indian Medical Service.—Commissions.

Leamington Spa, Warneford General Hospital.—Res. H.P. and H.S. Each £165.

Liverpool, David Lewis Northern Hospital.—Two Hon. M.O.'s for Ear, Nose, and Throat and Dermatological Departments.

Liverpool Sanatorium, Delamere Forest, Frodsham.—Asst. Med. Supt. £250.

Mansfield, Notts, Harlow Woods, Orthopædic Hospital.—Res. Surg. O. £275.

Margate, Royal Sea Bathing Hospital, &c.—H.S. At rate of £200.

Middlesex C.C.—Dist. M.O. for Tottenham. £180. Also Public Vaccinator.

National Hospital, Queen-square.—Hon. Surg. Asst. Also Hon. Asst. Surg.

Nelson Hospital, Merton, S.W.—Res. M.O. £100.

Nottingham General Dispensary.—Res. Surgeon. £250.

Nottingham General Hospital.—H.S. At rate of £150.

Poplar Hospital for Accidents, East India Dock-road, E.—Sec. Res. O. £175.

Prince of Wales's General Hospital, N.—Asst. Pathologist. £200.

Rotherham Hospital.—H.P. £180.

Sheffield, Jessop Hospital for Women.—Three Asst. H.S.'s. Each at rate of £100.

Sheffield Royal Infirmary.—H.P., H.S., Asst. Aural and Ophth. H.S. Also Asst. Cas. O. All at rate of £80.

Swansea County Borough.—Asst. M.O. £600.

Swansea Hospital.—Sen. Res. O. £300.

Wallasey Victoria Central Hospital.—Jun. H.S. At rate of £100.

Walsall General Hospital.—H.S. At rate of £150.

Weston-super-Mare General Hospital.—Res. H.S. At rate of £150.

Worcester County and City Mental Hospital, Powick.—Jun. Asst. M.O. £350.

Wrexham and East Denbighshire War Memorial Hospital.—Two Res. H.S.'s. Each at rate of £150.

Births, Marriages, and Deaths

BIRTHS.

PHILIP.—On Dec. 16th, at Maldon Court, Maldon, Essex, the wife of J. L. R. Philip, M.B., Ch.B., of a son.

MARRIAGES.

DICKIE—KIRBY.—On Dec. 17th, 1930, at Christ Church, Rawalpindi, by the Rev. J. G. Lister, M.A., Major Ronald Stevenson Dickie, R.A.M.C., younger son of the Rev. W. S. Dickie and Mrs. Dickie, Saltcoats, Ayrshire, to Violet Eleanor, younger daughter of Colonel J. T. Kirby, Indian Army, and Mrs. Kirby.

DEATHS.

HICKMAN.—On Dec. 18th, Lieutenant-Colonel James Hickman, R.A.M.C. (retired).

SIMEON.—On Dec. 15th, Edward A. Simeon, M.R.C.S., L.R.C.P., of Hoe-street, Walthamstow, E., aged 70.

STOWERS.—On Dec. 17th, 1930, at 38, Regent's Park-road, N.W.1, James Herbert Stowers, M.D., of 128, Harley-street, W.1 in his 80th year, peacefully in his sleep.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

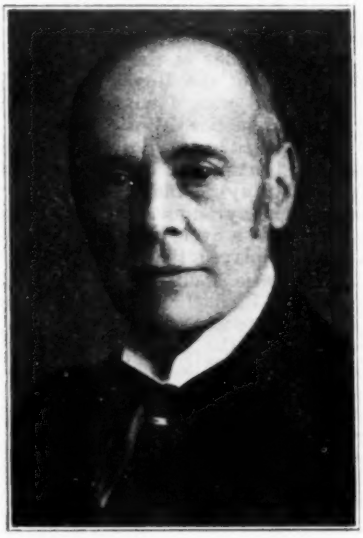
DONATIONS AND BEQUESTS.—Mr. Robert Slater Boddington, J.P., of Manchester, left £1000 to the Manchester Northern Hospital for Women and Children, to endow a bed in that hospital.—Mr. George Fowler Hutchings, of Weston-super-Mare, left £1500 to the Bristol Royal Infirmary to endow a bed in the women's ward, and £100 each to the Bristol Orthopædic Hospital for Crippled Children and the Bristol Blind Asylum.

OBITUARY

JAMES HERBERT STOWERS, M.D. Brux., M.R.C.S. Eng.

THE death of Dr. Stowers on Dec. 17th, in his eightieth year, removes the senior representative of British dermatology. With him there passes the last of those of who lived and flourished with Jonathan Hutchinson, Colcott Fox, Radcliffe Crocker, and Malcolm Morris.

James Herbert Stowers was the fourth son of Nowell Stowers, M.R.C.S., who practised in Kennington. He was educated at St. Bartholomew's Hospital, whence he qualified in 1873, and among the teachers of whom he often spoke with admiration were Luther Holden and James Paget. During the next few years he gained a varied experience as ophthalmic house surgeon, registrar, dermatological assistant, and administrator of anæsthetics at Bart.'s, and resident medical officer at the Evelina Hospital for Sick Children. He entered general practice in Shrewsbury, but soon returned to London to specialise in dermatology, and was appointed physician to St. John's Hospital, Leicester-square. He also joined the staff of the North-West London Hospital, where he remained at work until over 40 years later, when it was amalgamated with the Hampstead General Hospital. Most of his professional work was done at the St. John's Hospital and at the North-West London. The former institution owes him a special debt, for it was largely due to his initiative and tact that the post-war reorganisation of its medical staff was made possible, and its important position as a teaching centre was retained and enhanced. His enterprise and effort in founding the London School of Dermatology was recognised by his colleagues, and some years ago their appreciation was shown by a complimentary dinner, at which he received well-deserved congratulation. Dr. Stowers was a member and corresponding member of various British and foreign dermatological societies, and a past-president of the British Dermatological Society and the Dermatological Section of the Royal Society of Medicine. Outside his own specialty, also, he was well known, for he belonged to many different societies which reflected the wide range of his interests. Despite numerous appointments to hospitals and institutions he found time to take part in local affairs and politics, while in later years his experience was always at the service of the London and Counties Medical Protection Society. As a member of the Council for over 30 years he showed a keen regard for medical ethics, and his consistent work was of much value to the society. His attention to detail, the clarity and precision of his utterances, and his personal charm would have been assets in many walks of life, and they found full scope in the career he had chosen.



DR. STOWERS.

Photograph: Elliott & Fry.

During the late war Dr. Stowers took charge of the Department for Diseases of the Skin and Venereal Disease at University College Hospital. He married Henrietta, daughter of Edward Shepherd, and she is left with two sons, one of whom, Dr. Raymond Stowers, is in active medical practice.

CHARLES ALGERNON STIDSTON, D.S.O., M.D. Lond.

WE have to record that Mr. C. A. Stidston, surgeon to the Royal Hospital, Wolverhampton, died on Dec. 15th in his fiftieth year. Son of the late Charles Stidston, of Plymouth, he received his medical education at St. Bartholomew's Hospital where he gained the Foster Prize and the Wix Prize. He went to Wolverhampton in 1907 as resident medical officer of the General, now the Royal Hospital, and was appointed honorary assistant surgeon two years later, becoming full surgeon in 1920. On the outbreak of war in 1914 Mr. Stidston was called up with his Field Ambulance, the 2/3rd North Midland (Territorial Force). He served throughout the war and was for 18 months at the front in France. He was in command of his field ambulance during the difficult and anxious fighting which followed the battle of Cambrai, and for services in the field on this and other occasions was awarded the D.S.O. At the end of the war he retired with the rank of lieut.-colonel and resumed his practice at Wolverhampton.

We owe the following appreciation to one of his hospital colleagues. "Charles Algernon Stidston, whose loss is deplored not only by his colleagues and friends but by the inhabitants of Wolverhampton and South Staffordshire among whom he lived and practised for 21 years, was a man of original personality and varied gifts. His abounding vitality, his charm of manner, and breadth of sympathy earned him the devotion of his patients, rich and poor alike. He had a lively and spontaneous wit and a gift of expression both in speech and writing which were the delight of his friends. He could be pungent on occasion but even his victims were ready to forgive him for his wit, and enjoy a laugh against themselves. He was the warmest, the most faithful, the most generous of friends. He had his fierce hatreds too, for there was nothing half-hearted about him. To serve a friend no effort and no sacrifice were too great. With equal prodigality he spent himself in serving many who had no claim but their needs and his own generosity.

"At the Royal Hospital he threw himself into his work with the zest and devotion which he displayed in all his pursuits. Although he had a large and very successful general practice, it was his ambition and intention to devote himself entirely to surgery as soon as circumstances permitted. It was a tragic disappointment to find himself disabled by the illness to which he finally succumbed, at the very

moment when he saw the prospect of realising his ambition. For five months he lay ill and almost helpless. He never murmured or complained, and bore himself throughout with characteristic dignity and fortitude. Courage, generosity, and modesty were parts of his nature and they displayed themselves equally in war and in peace."

Mr. Stidston leaves a widow with one daughter.

CHARLES HENRY PHILLIPS, M.D. Durh., F.R.F.P.S. Glasg.

Dr. C. H. Phillips died on Nov. 23rd at Bournemouth where he had lived for some years in retirement. Born in 1847, he was first trained for a business career, but his attention was diverted towards medicine and he qualified from Owens College, Manchester, in 1875. After working for some time at Bury in Lancashire, he went to the Potteries in 1879, and was for 36 years visiting medical officer to the Joint Infectious Diseases Hospital at Bucknall, Stoke-on-Trent, and to the Small-pox Hospital at Bagnall. It was largely through his efforts that these institutions grew from small beginnings to their present state of efficiency. "Dr. Phillips was never one to acclaim his own achievements," writes a colleague, "but to those who had the privilege of his friendship, as I had for a period of 28 years, his sterling character, as well as his great professional abilities have made a lasting impression. He had a quiet dignity of manner associated with infinite patience—qualities which endeared him to all his patients, both in hospital and in the large private practice he carried on for so many years. He never spared himself in the carrying out of any of his duties, and his special skill in midwifery, gained from much experience, often led fellow practitioners to seek his advice and assistance, which was always given ungrudgingly. For many years he took an active part in municipal affairs in Hanley, and was appointed a justice of the peace; further, he was chairman of the local Panel Committee under the National Health Insurance Act. He retired from practice in 1923, but until the end took the same keen interest in all matters connected with the medical profession. His latter years were shadowed by bereavement and an increasing loss of sight, but he bore his afflictions with fortitude and cheerfulness."

FREDERICK WILLIAM BENNETT, M.D. Lond., B.Sc. Manch.

WE have already recorded the death of Dr. Frederick Bennett at Leicester on Dec. 3rd at the age of 70. The following notice is contributed by two of his colleagues:—

Dr. Bennett studied medicine at Owens College. He became M.R.C.S. in 1883, M.B. Lond., with honours in medicine, in 1884, and M.D. a year later. After having held house appointments in Manchester hospitals, he started practice in Leicester, and his first appointment was hon. assistant physician to the infirmary. But he was attracted to what was then a new specialty, that of laryngology. A few of the larger hospitals were creating departments for the treatment of diseases of the throat, nose, and ear, but many of those who applied for such appointments did so only to get a footing on the hospital staff and resigned them as soon as possible for general surgery. As there was very little teaching to be had in this country, Bennett, like many others, went abroad and studied in Vienna. On his return he was made the first aural surgeon to the infirmary. He remained faithful to his choice and continued to hold this appointment for nearly 30 years.

The way of a pioneer is always difficult. The hospital provided instruments and accommodation (of a sort) for his out-patients, but no house surgeon attended and no nurse assisted. Bennett engaged one of the latter from outside at his own expense. Very few beds were at his disposal, an odd one here in a medical ward, there in a surgical, and scattered throughout the hospital. Only minor operations were permitted to the aural surgeon; tonsils and adenoids, polyp, and so forth. Any such as the opening of the mastoid bone were claimed by the general surgeon as his prerogative. It is a tribute to Bennett's skill, his energy, his personal charm, his relations with his colleagues, and his unfailing interest in his work, that when he retired from the active staff he left a department well equipped, greatly enlarged, and fully recognised as an important branch of the hospital practice. For many years he was a member and a constant attender at the meetings of the Section of Laryngology of the Royal Society of Medicine. When, after the war, foreign members were excluded, his sense of justice, always high, led him to resign. On that account he was not well known to the younger generation, but he will be remembered with the kindliest of feelings by the older men.

Bennett was a man of many and varied interests. He was keenly fond of music, a cycle of "The Ring" was a joy to him, and he played the 'cello in local orchestras. But he was also fond of science and 20 years after he qualified in medicine he took the degree of B.Sc. His great love was geology. He was, until his death, president of the section of geology in the Leicester Literary and Philosophical Society. Many holidays in Switzerland were spent in the study of glacial action, and he was the authority on the rocks of Charnwood Forest—that perpetual puzzle to geologists. In addition to all this he took his full share as a prominent citizen. Years ago he was a member of the school board. In 1891 he drew up the scheme for the training of teachers in elementary science, which was then just permitted to be taught in elementary schools, real pioneer work. As a coöpted member of the city museum and library committee he worked for years. As one of the earliest subscribers to the local university college, and as a member of its council, he worked hard to encourage it, as well as frequently supporting it financially. Such were his pleasures, real joys to him.

Mrs. Bennett died about three years ago. They leave two daughters.

A. L. McC.
A. V. C.

THOMAS VINCENT CAMPBELL, M.B. Edin.

Dr. T. V. Campbell, who died at Edinburgh on Dec. 16th, had retired from active missionary service in South India in 1920. Born at Londonderry in 1863, he graduated at Edinburgh in 1888 and was appointed medical missionary at Jammalamadugu, in the Cuddapah district of South India, two years later. Owing to ill-health he had to return to England for a time, but in 1912 he and his wife—formerly Dr. F. G. Longbottom, of Halifax—returned to India to take charge of a new hospital, founded in memory of Dr. Wardlaw Thompson, at Chikka Pallapura, where they together established a medical mission work as successful as that at Jammalamadugu. In 1908 Dr. Campbell was awarded the Kaisar-i-Hind Medal for public services. Mrs. Campbell survives her husband with a son and two daughters.

NOTES, COMMENTS, AND ABSTRACTS

RADIATION FROM WIRELESS VALVES.

BY H. M. S. TURNER, M.D., F.R.S. EDIN.,
LATE EXAMINER IN PHYSIOLOGY, CAIRO UNIVERSITY.

IN high-power wireless valves used for transmission the heat generated may be so great that ordinary glass is unable to withstand it. To overcome this difficulty the valves may be provided with a water-jacket or a highly refractory substance may be used instead of glass, with air cooling. In certain valves fused silica is used for this purpose. Valves of the latter type in use appeared to me to possess all the necessary factors for the production of X rays, to the passage of which fused silica would offer comparatively little opacity. I decided to expose some X ray films to the emanations from such valves. Eastman Kodak Duplitized films were used. Each was enclosed in its light-proof container and one film, in its container, was enclosed in an envelope made from thick sheet-lead on the front of which a cross had been cut out after the manner of a stencil. (Fig. 1.) In front of the others letters cut from sheet-lead were closely applied. (Figs. 2 and 3.)

In the early days of X ray apparatus an induction coil giving about a 12-inch spark was used with ordinary Crookes's tubes. The tubes I used then were about the size of a Jaffa orange and the induction coil was fitted with a spring contact-breaker such as is found on a "buzzer." At that time we knew nothing of the properties of the rays and had to learn the correct length of exposure by trial and error. The efficiency of such an apparatus may be judged when it is mentioned that exposures as long as two hours were sometimes given to skiagraph a chest. Fifteen minutes and half an hour were quite common.

As wireless transmission valves are not designed to produce X rays, it was decided to start with a minimum exposure of two hours, and to place the films at a distance of eight inches from the valves. Six valves in a "bank" were used for the experiment and during the exposure the voltage and milliampèrage were recorded and marked on each film. All the films were exposed simultaneously, and the time when the exposure was commenced was also recorded on the film after development—viz., at 10 hrs. 43 mins. P.M. The voltage during exposure was uniformly 9000 and the milliampèremeter reading was 160 to 170. I was informed that owing to a transformer being out of action the voltage was much lower than it should have been and that the normal reading should be about 18,000 v.

The results of the experiment will be seen from the accompanying films, which prove quite definitely not only that the valves are radio-active, but that the emissions appeared to be quite appreciable in quantity—so much so that the question of possible effect upon attendants arises. It is customary to protect the transmission gear by a safety-fence, provided with one or more gates giving access to the apparatus. These gates operate switches, so that if an individual passes through the gate whilst transmission is in progress the circuit is broken and the current is cut off. The fence does not allow approach nearer than about 15 or 16 feet and, as the effect of any radio-active emissions would vary inversely as the square of the distance, the cumulative effect, if any, may be small. Nevertheless, with an individual working constantly in the vicinity, even at a distance of 16 feet or over, the possibility is one to be borne in mind.

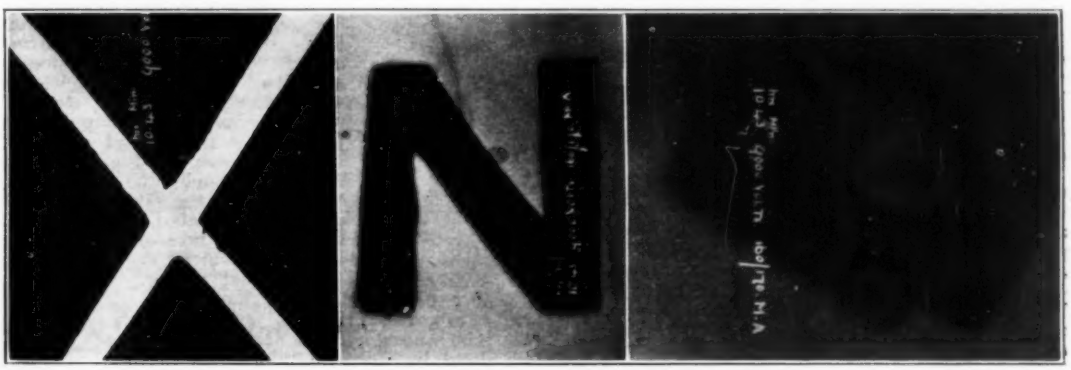
I was unable to get any history of erythema or any other indication of effect from the attendants I saw; but it should be realised that one does occasionally meet with individuals who are inclined to attribute many things to "wireless." For example, I remember many years ago in the days of the old rotary spark-gap that there was quite a common idea prevalent among the men that working near the spark-gap made them impotent—for which effect there could have been no possible cause. Had such a complaint been made by a man working in the vicinity of a bank of valves, such as those which produced the accompanying films, one might have given a certain amount of credence to it. For obvious reasons no leading questions were asked. Doubtless every new occupation will have its own peculiar diseases. Perfect protection would be given if the valves were screened with metal, or possibly even with lead glass screens of suitable proportions.

I am unable to give any information as to the precise nature of the emanations. I do not know their power of penetration, for I had no means at hand for measuring it; neither can I estimate the quantity, say, in terms of pastille doses. I simply desire to record the fact that skiagrams can be taken by the agency of such valves.

Although the exposures were made simultaneously under exactly the same conditions of distance, voltage, and milliampèrage—except as regards the length of exposure—each film was exposed to a different valve. Therefore any slight variations in the quality of the respective negatives may depend upon differences in the individual valves. Each valve has a very robust filament, which is heavily thoriated.

Some of the films (e.g., Fig. 3) show a double

FIGS. 1 2 3



Exposure 2 hours. 3 hours. 6 hours.

image. This is due to rays from an adjacent valve striking the film at an angle and giving a "localisation" effect. In the film showing the letter "N" the shadow of the string by which the sheet lead letter was supported can be seen.

THE PROTEASES OF PLANTS.

A PAMPHLET by Prof. S. H. Vines, intended to serve as a reply to R. Willstätter, has reached us.[1] The author's experiments, carried out during the years 1897–1910 upon the proteolytic enzymes of plants, led him to conclude that there existed two distinct enzymes; one was a protein-splitting enzyme or peptase which yielded albumoses and peptones, the other a proteose-splitting enzyme, comparable with Cohnheim's erepsin, which, acting on proteoses, converts these into amino-acids—notably, tryptophane. Willstätter contests this view, and considers the two digestive processes to be effected by one and the same protease or proteinase. Prof. Vines's argument is that it does not follow that a peptone-splitting erepsin may not occur in plants because no such enzyme can be certified in animals, and asserts that confirmation of his views will shortly be supplied by Prof. Nag, working at the Bose Research Institute, Calcutta.

BIRTH CONTROL: METHODS AND RESULTS.

AT the Population Conference which met at Geneva in September, 1927, a group was formed with the object of collecting and impartially summarising every year information of statistical and medical importance about birth control as it becomes available in the course of each year. Contributions from different countries are edited by Dr. C. P. Blacker, who is honorary medical secretary of the Birth Control Investigations Committee. The third issue of the summary, which has recently appeared,[2] contains contributions from three countries—Denmark, Germany, and Great Britain—the last being much the fullest. In all three a description appears of the Gräfenberg ring. Dr. Gräfenberg himself describes his revised method in some detail, but does not analyse this now considerable accumulation of figures. Dr. Norman Haire states that only in three cases out of 200 were there untoward symptoms following the insertion of the ring. The experience of Dr. Leunbach (Denmark), however, does not bear out these favourable results. In a series of 177 cases, the ring fell out on 20 occasions. It descended as far as the external os in three and, though properly in position, failed to prevent pregnancy in one. Dr. Leunbach adds "moreover, the method is far from harmless. In many cases it has been necessary to remove the ring on account of metritis and parametritis or persistent bleeding from the uterus."

Certain interesting statistical results are reported from this country, which go to show how much the existing contraceptive methods leave to be desired. The results of Mrs. Florence's investigations at the Cambridge Women's Welfare Centre[3] are summarised in some detail. Among the most notable of her findings is the frequency of the failure of coitus interruptus among clinic patients. Thus, of the 118 patients who, before coming to the clinic, had made use of coitus interruptus, no less than 105 had found the method to fail. Among these 105 women there had been 409 pregnancies. Though these figures must not be taken as representing the success of coitus interruptus in the population as a whole (in so far as those who use the method successfully would not attend a birth control clinic), they are nevertheless significant. Statistical evidence is also adduced showing that much difference of opinion exists among medical authorities as to what is the optimum size of an occlusive pessary for normal women, and what is, on the whole, the most satisfactory make of pessary for average women. At the birth control clinics whose results are here reported the pessaries most used are the Mensinga and the Dumas. The prorace cervical cap is little used.

Interesting researches on chemical spermaticides and on the effects of these on the uterus and vagina of animals are summarised by Dr. Blacker in his report for Great Britain. Dr. J. R. Baker, working in the zoological laboratory of the University of Oxford, has shown that the assumption that because a given substance is a good germicide it is also a good spermaticide is wholly fallacious. Dr. H. C. Carleton and Dr. H. S. Florey have shown that most of the spermaticides on the market have no appreciable effect on the endometrium and vaginal mucous membrane of laboratory animals, even when applied in relatively large quantities. These investigators have also shown that the ascent of spermatozoa into the uterine cavity is accomplished through the intrinsic powers of locomotion of the spermatozoa rather than by the mechanical sucking action of the uterus itself.

[1] The Proteases of Plants—a record and a reply. By S. H. Vines, F.R.S. London: Macmillan and Co., Ltd. 1930. Pp. 32. 1s.

[2] International Medical Group for the Investigation of Contraception. (Third issue.) Obtainable from the Hon. Mrs. Farrer, 13, Lansdowne-crescent, London, W. 6d.

[3] See THE LANCET, 1930, i., 919.

A HYDROSTATIC PUMP ATTACHMENT.

Dr. G. A. Metcalfe has sent us an illustrated description of a modification which he has made, with the help of Messrs. Down Bros., Ltd., London, S.E.1, in the hydrostatic pump supplied by them. He says: For some time past I have been using a hydrostatic pump for obtaining suction in operations on the nose and throat, and have been greatly impressed by its value and efficiency. One great drawback to the usual hydrostatic pump is the fact that a good head of water, which is essential for its proper function, tends to blow the pump off the tap. In the pump illustrated, four metal hooks have been brazed to the lead by which the pump can be easily and securely tied on. It may be necessary to have a tap in the theatre adapted to the nozzle, but this can be done by any plumber. The rather objectionable noise of splashing can be silenced to a great extent by fixing a length of wide rubber tubing to the outlet and allowing it to open under water in a basin.

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IN an annotation with this title on p. 1357 of our last issue it was stated that the amount of avertin used "should never exceed 1·0 g. per kg. of body-weight." The quantity mentioned should have been ten times less—namely, 0·1 g. per kg.

THE Anglo-French Drug Company (238a, Gray's Inn-road, London, W.C. 1) have sent us a copy of their block diary for 1931, measuring 6 by 4½ inches, and showing a page to a day. It serves as a useful accessory to the writing table. The list of pharmaceutical products formerly attached to the inside of the front cover is not now included.

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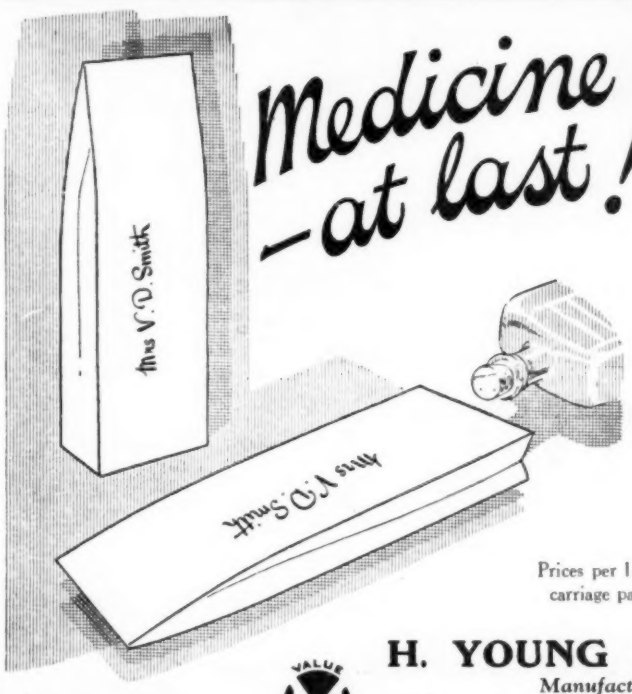

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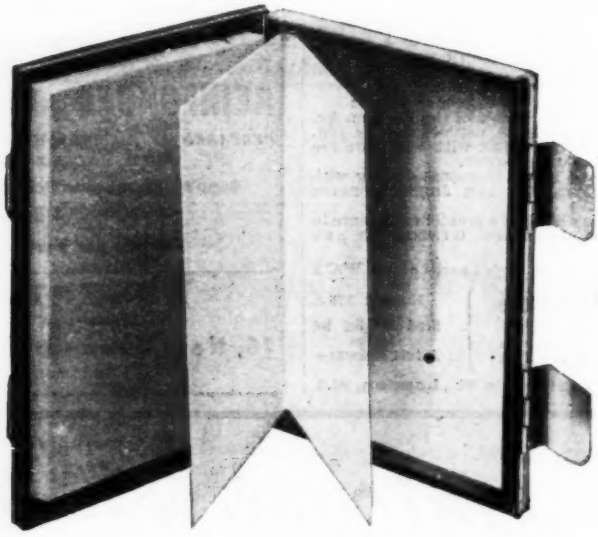

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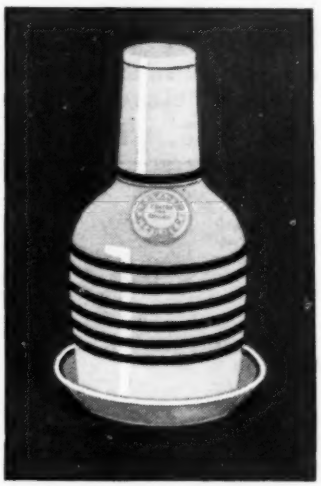

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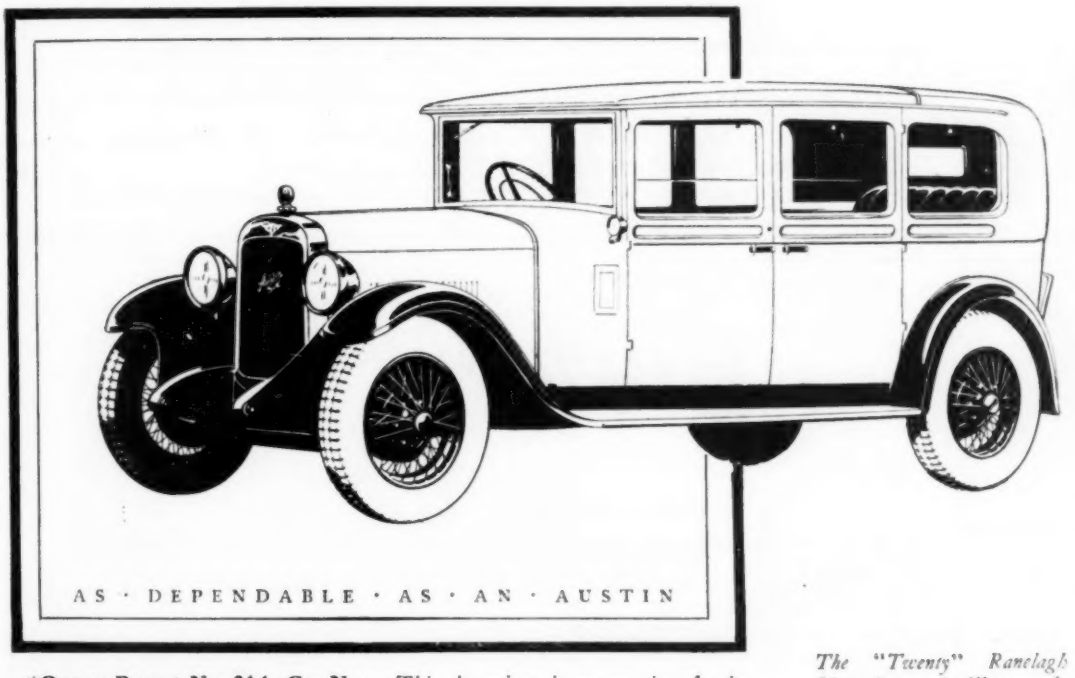

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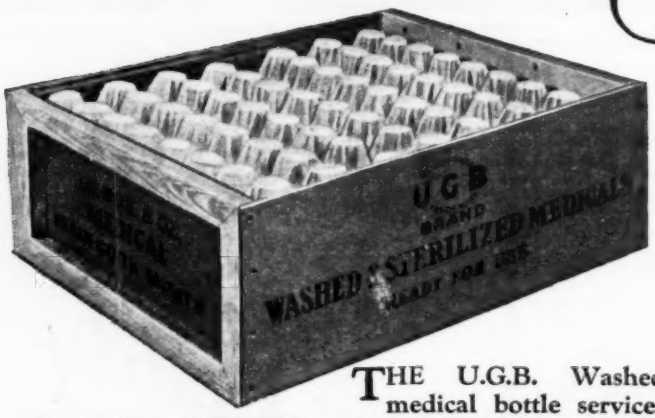

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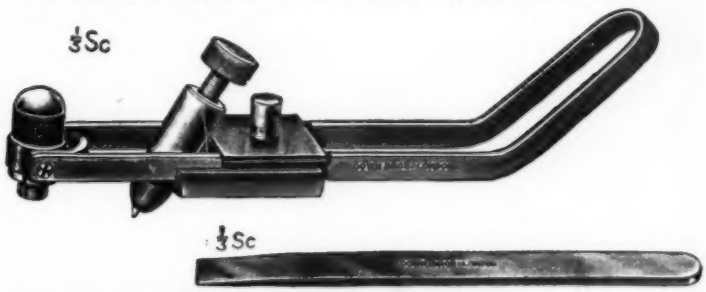

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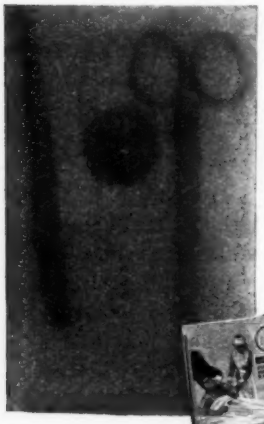

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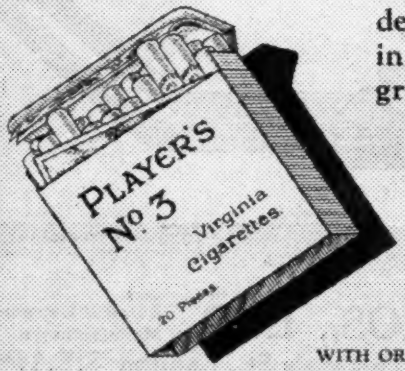

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1 c.c. contains 5 international units.

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Wright's Coal Tar Ointment.
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Although there is no secrecy as to the composition of *Liquor Carbonis Detergens* (it is described as "an alcoholic solution of coal tar"), the method of manufacture is unique. Imitations will be found to be produced by simple digestion, usually accompanied by some primitive, perfunctory and inadequate stirring; whereas, in the case of the genuine product, the intimate contact required, for the complete extraction of all the soluble antiseptic constituents, is attained by a series of complicated processes, involving the use of highly specialized machinery.

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MEDULLA RUBRA

BONE-MARROW IN ANÆMIA FROM HÆMORRHAGE

W. Borchardt (*Deut. med. Woch.*, March 28th, 1930, p. 521) records the results of his experiments on young dogs in which anæmia had been artificially produced by the removal of about half their blood. In the first series some of the animals were fed with rib-marrow, others with marrow from the long bones. Control animals received a corresponding amount either of fat or of liver extract. The basal diet in each case contained a sufficiency of iron (5 mg. per cent.). Only the animals receiving the red rib-marrow showed a definite increase of weight, and their hæmoglobin formation was more rapid than that of the others. In the next series the experiment was repeated, but the iron content of the diet was reduced to 1·4 mg. per cent. The result was similar but more striking, the dogs receiving the rib-marrow regaining their hæmoglobin far more quickly than the others.

THIS extract from the "Epitome of Literature," published in the "BRITISH MEDICAL JOURNAL" dated May 3rd last, is important as representing, in 1930, a complete justification of the formula upon which

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THE FOOD THAT BUILDS THE BODY

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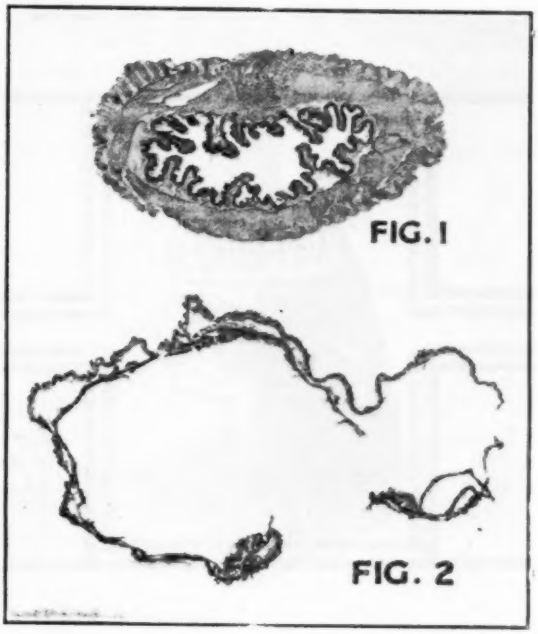
Further Research Work on Gastric Atony

By "PATHOLOGIST"

We recently published an article on dilated stomach and in it showed photographs of a "Bemax" normal stomach and a "deficiency B vitamin" abnormal stomach. We thought it would be of interest, therefore, to go further into the matter and give a description of the histology by means of direct photographs.

Rats were used for the test, and both the reproductions shown here are of the cardiac end of the stomach.



The mucous membrane in the stomach of a rat is lined with squamous epithelium.

Two diets were used in this piece of work, No. 1 consisting of 10% of "Bemax" and 90% of a B deficiency food made up of rice starch, casein, mineral salt mixture, and a known tested cod-liver oil. Diet No. 2 consisted of the same B deficiency diet, and differed from No. 1 only in that No. 1 contains 10% of "Bemax."

Fig. No. 1 (magnification × 10) is a photograph of a section of the cardiac end of the stomach of a "Bemax" rat showing the two muscular layers, the areolar tissue and the mucous membrane.

Figure No. 2 (magnification × 10) is a section of the cardiac end of the stomach of a rat which had been on the same deficiency diet for four and a half weeks. It is almost incredible that by placing an animal on a complete B deficiency diet a section similar to that shown in Figure No. 2 is produced in such a short time as four and a half weeks.

The section in Figure 1—that of a "Bemax" stomach, on further magnification showed the mucous membrane in excellent condition, but the section in Fig. 2 on further magnification disclosed marked atrophy of the external muscular layer and extreme atrophy of the inner muscular layer and mucous membrane.

Detailed reports of further research work will be sent on request.

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Max-imum Natural Vitamin B.

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"Ovaltine" is a complete natural food, yielding in one cupful a greater food value than 3 eggs. This delicious beverage is unquestionably a tonic nerve nutrient of a high order.

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M. 241

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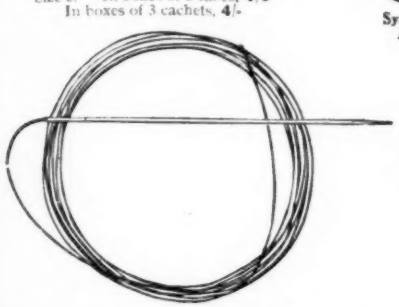

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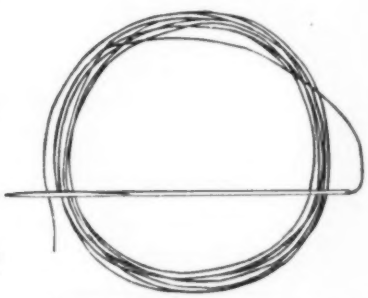

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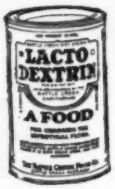

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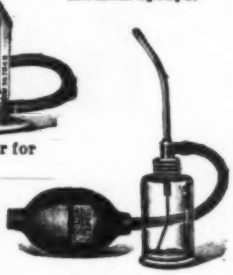

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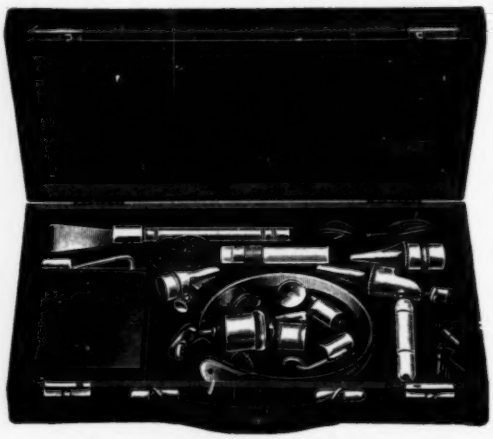

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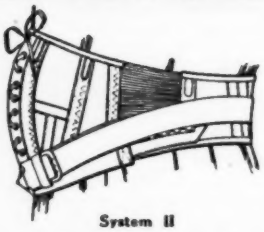

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Also completely detached Villas for Mild Cases, with private suites if desired. Voluntary Patients received. Twenty acres of grounds, Hard and Grass Tennis Courts, Bowls, Croquet, Squash Rackets, and all indoor amusements, including Wireless and other Concerts. Occupational Therapy, Physical Drill, and Dancing Classes. X-ray and Actino-therapy, Prolonged Immersion Baths, Operating Theatre, Dental Surgery, and Ophthalmic Department. Chapel.

Senior Physician: DR. HUBERT JAMES NORMAN, assisted by three Medical Officers, also resident, and Visiting Pathologist.

An Illustrated Prospectus may be obtained upon application to the Secretary.

HOVE VILLA, BRIGHTON.—Convalescent Branch of the above.

THE OLD MANOR SALISBURY

A Private Hospital for the Care and Treatment of those of both sexes suffering from MENTAL DISORDERS.

Extensive grounds. Detached Villas. Chapel. Garden and dairy produce from own farm. Terms very moderate.

CONVALESCENT HOME AT BOURNEMOUTH standing in 12 acres of ornamental grounds, with tennis courts, etc., which Patients or Boarders may visit, by arrangement for long or short periods.

Illustrated Brochure on application to the Medical Superintendent, The Old Manor, Salisbury. Telephone: 51.

LINFORD SANATORIUM,

RINGWOOD, NEW FOREST, HANTS.

Established 1898 for the treatment of Tuberculosis. Radiators and Electric Light throughout. Hot and cold water and shower bath in nearly all rooms. Powerful X-Ray Plant. Ultra-Violet Rays. Full Nursing Staff. All forms of treatment available.

Farm of 120 acres, including 40 acres wood. Herd of Tuberculin-tested Guernsey cows kept.

Resident Physicians—ARTHUR DE W. SNOWDEN, M.D., B.Ch. (Cantab.).
A. G. E. WILCOCK, M.R.C.S., L.R.C.P.
COLIN CASSIDY, M.B., B.Ch. (Cantab.).

RUTHIN CASTLE

(Formerly Duff House, Banff).

The first Private Hospital in the United Kingdom to be fully provided with a whole-time specially qualified Staff of Doctors, Analytical Chemists, Bacteriologists, Radiologists, Nurses, Dietists, Masseurs, and Masseuses, and a full equipment of Laboratories, X-rays, Electrocardiograph, Artificial Sunlight, and Medical Baths.

The Hospital is equipped for the diagnosis and treatment of any form of ill-health, except Mental and Infectious Diseases. The fees are inclusive.

The climate is mild and the neighbourhood beautiful.

Apply: THE SECRETARY,
Ruthin Castle, North Wales.

Telegrams: CASTLE RUTHIN. *Telephone:* 66 RUTHIN.

MUNDESLEY SANATORIUM

Specially built for the treatment of Tuberculosis. **Spacious public rooms recently completed in a new central building.** Aspect S.S.W., on a carefully chosen site. Pure, bracing air. High sunshine record. Heliotherapy. Arc-light treatment. One mile from the coast. Electric light throughout. X-Ray installation. Full day and night Nursing Staff. Wireless (headphones) throughout.

Resident Physicians:
S. VERE PEARSON, M.D.(Camb.), M.R.C.P.(Lond.).
L. WHITTAKER SHARP, M.B.(Camb.).
ANDREW MORLAND, M.B. (Lond.).

Apply: Mr. D. C. FORD, Secretary,
The Sanatorium, Mundesley, Norfolk.
Telephone: Mundesley 4.

TOR-NA-DEE SANATORIUM
MURTLE, DEESIDE, ABERDEENSHIRE

Medical Director: DAVID LAWSON, M.D., F.R.S.E.

FULLY EQUIPPED WITH *EVERY MODERN APPLIANCE* FOR THE DIAGNOSIS AND TREATMENT OF ALL FORMS OF TUBERCULOSIS & ALLIED DISEASES.

Physician Superintendent: J. M. JOHNSTON, M.B., D.P.H., etc.

Full particulars and Prospectus on application to the Secretary.

INCLUSIVE TERMS: SEVEN GUINEAS A WEEK

NORDRACH-UPON-MENDIP SANATORIUM.
FOR THE TREATMENT OF PULMONARY AND OTHER FORMS OF TUBERCULOSIS WAS OPENED IN JANUARY, 1899.

Patients are received for open-air, inoculation, or operative treatment. There are X-ray and ultra-violet ray installations. Full nursing staff. The Sanatorium stands in gardens and private grounds of 65 acres, at an elevation of 862 feet above sea-level, surrounded by woods and moorland. The patients' rooms are heated by hot-water pipes and electrically lighted.

FEES 4, 5, AND 6 GUINEAS PER WEEK.

Physicians: ROWLAND THURNAM, M.D., JAMES HENDERSON, M.B., Ch.B.Glas.

For full particulars apply to *The Secretary*, Nordrach-upon-Mendip, Blagdon, Bristol. *Telegrams:* Nordrach, Blagdon. *Telephone:* Blagdon 23.

KINGUSSIE, N.B.

THE GRAMPIAN SANATORIUM.

Situated in the Upper Speyside district of Inverness-shire. One of the highest inhabited districts in Britain.—"The Switzerland of the British Isles." Bracing and dry mountain climate, well sheltered. Sanatorium specially built for the Open-Air Treatment of Tuberculosis. Opened in 1901. Elevation nearly 900 ft. above sea-level. Central Heating. Electric light throughout buildings and in rest shelters. FULLY EQUIPPED X-RAY PLANT. All forms of Treatment available, including facilities for Treatment by Artificial Pneumothorax and Ultra-Violet Rays for Surgical cases of Tuberculosis. **A few rooms are now reserved for surgical cases not requiring immediate operation.** Terms: £4 6s. 8d. to £6 6s. 0d. per week **inclusive, no extras.** FELIX SAVY, M.D., **Physician-Sup**t.—*For Particulars apply:* **Wm. KEIR, Secretary.**

DARTMOOR SANATORIUM. 750 FEET ABOVE SEA-LEVEL

Established 1903 for Treatment of Pulmonary and other forms of Tuberculosis. Sheltered Situation on the slopes of the bracing Moorland. Radiographic Installation, Electric Light, Central Heating, Separate Bedrooms, Efficient Treatment combined with individual comfort and minimum restrictions. Illustrated Prospectus on request to the Resident Physician: C. H. BERRY, M.R.C.S., L.R.C.P., Dartmoor Sanatorium, Chagford, Devonshire. Telephone: 11 CHAGFORD.

PRIOR PLACE SANATORIUM
HEATHERSIDE, CAMBERLEY.

RECENTLY OPENED FOR THE TREATMENT OF PULMONARY TUBERCULOSIS.
WELL SITUATED ON HIGH GROUND AND SURROUNDED BY PINES AND HEATHER.

RESIDENT MEDICAL SUPERINTENDENT: Dr. H. O. BLANFORD, late Medical Superintendent, King Edward VII. Sanatorium, Midhurst, to whom applications for particulars may be made.

SWISS SPAS

BADEN

On the main line Zürich-Basle and Zürich-Berne. The hot springs of Baden were already known to the Romans. 17 radio-active wells at a temperature of 118·4°F. They contain sulphur and sodium chloride. The baths are obtainable in the hotels themselves. *Treatments:* warm baths, shower-baths, massage, electric baths, inhalation, drinking cure, diagnostic-therapeutic institute, mechanotherapy. Recommended for Metabolic diseases, rheumatism, gout, sciatica, diseases of the muscles, bones and joints, retarded convalescence after injuries and operations.

SEASON: 1ST APRIL TO 1ST NOVEMBER.

For Information apply to: Spa Director, Baden, Switzerland.

LOÈCHE-LES-BAINS

One hour by electric railway from Loèche (main station on the Simplon-route). Mild alpine climate. The baths were already known to the Gauls and Romans. The radio-active springs contain chiefly sulphate of lime. Two swimming pools. Every hotel has its own bathing installation. *Treatments:* Warm baths, douche-massage, injections, air and sun baths. *Recommended for:* gout, rheumatism, sciatica, anæmia, post-operational conditions, convalescence, gynæcological diseases, circulatory disturbances, skin diseases.

SEASON: MAY TO OCTOBER.

For information apply to: Hotel Association, Loèche-les-Bains, Switzerland.

PASSUGG

Near Chur. Situated on a picturesque plateau. Mild sub-alpine climate. Vast Forests.

Treatments: The Ulricus spring (alkaline-muriatic), Belvedra spring (chalybeate), Fortunatus spring (alkaline-muriatic with Iodine), Helen spring (mildly alkaline and acid), Theopnil spring. All varieties of accessory treatment. Dietetic treatment. *Indications:* Diseases of the digestive organs, diseases of the liver and bile ducts, kidney and bladder diseases, diseases of nutrition and metabolic diseases, especially diabetes, arterio-sclerosis diseases of the blood and tropical diseases.

SEASON: MAY TO OCTOBER.

For information apply to: Spa Director, Passugg, Switzerland.

RHEINFELDEN

10 miles from Basle, on the railway line Zürich-Basle. Famous for its vigorous brine, containing 31 per cent. salt, and for its "Kapuziner"-Spring, a highly diuretic calcium and boric acid well, and for its "Magdalena" spring, containing sulphates of calcium, sodium and magnesium. Eight bath-establishments, with up-to-date installations.

Treatments: Brine baths, carbonic acid brine-baths, drinking, mud-packs, "Mutterlauge"-packs, inhalation, massage, gymnastics, all varieties of electric treatment, dietetic treatment. *Recommended for:* gout, rheumatism, arthritis, women's diseases, sterility, obesity, children's diseases, arterial hypertension, diseases of the heart, affections of muscles, bones and joints, convalescence.

Any information and detailed booklet gladly supplied by: Enquiry Office, Rheinfelden, Switzerland.

SCHINZNACH

Railway connections: Basle-Brugg-Zürich, and Berne-Brugg-Zürich. The hot springs of Schinznach were in use in Roman times and belong to the strongest radio-active sulphur wells on the Continent. Newly equipped, comfortable baths and inhalation rooms. *Treatments:* baths, drinking, sulphur-mud and sulphur-water packs, irrigations, inhalatorium, massage, X-rays. *Recommended for:* gout, rheumatism affections of bones and joints, non-tuberculous catarrhs of the air passages, arterio-sclerosis, diseases of the skin, diseases of women, children's diseases.

SEASON: MAY TO OCTOBER.

For information apply to: Spa Director, Schinznach Bad, Switzerland.

TARASP-SCHULS-VULPERA

The chief Spa of the lower Engadine. Glauber salts wells. The advantage of this spa lies in the combination of the curative properties of the waters with the alpine air and sun.

Ten mineral springs of various composition. Up-to-date equipment for drinking and baths, air and sun-baths, swimming baths, Zander-hall, X-Ray institute, diet. *Recommended for:* affections of the digestive organs, metabolic ailments, nervous troubles, affections of the organs of circulation, of the organs of respiration, of the genito-urinary system, malaria.

Information supplied by: General Manager, Kurhaus Tarasp.

For information and the booklet "SWISS SPAS AND THEIR MINERAL SPRINGS" (sent gratis), please apply to the OFFICE OF THE SWISS FEDERAL RAILWAYS, 11b, Regent-street, London, S.W.

THE RESIDENTIAL TREATMENT OF ALCOHOLISM & DRUG ADDICTION.

RENDLESHAM HALL

(Postal Address), WOODBRIDGE, SUFFOLK

RENDLESHAM HALL, which is open to receive patients, is essentially a Sanatorium. Its daily life and routine are that of an ordinary comfortable holiday or health resort, or of a large country house. Each patient has all the privileges of a guest consistent with the prescribed medical treatment.

Rendlesham Hall has 45 Bedrooms, and about 450 acres of Gardens and Park. It has also a private Nine-hole Golf Course, Tennis and Croquet Lawns, and Bowling Green.

Illustrated Booklet, giving particulars as to terms, etc., can be had on application to THE RESIDENT MEDICAL SUPERINTENDENT.

Telegrams and Telephones:
WICKHAM MARKET 16.
(Toll Call from London.)

RENDLESHAM HALL

To those desiring to be nearer London,

THE MANSION, BECKENHAM PARK, BECKENHAM,

as carried on for the last twenty years, is available.

Booklet and particulars from THE RESIDENT MEDICAL SUPERINTENDENT.

Telephone: BECKENHAM 1640. *Telegrams:* NOROTORIUM, BECKENHAM

Proprietors: THE NORWOOD SANATORIUM, LIMITED.

INEBRIETY.

Telephone: 16 Rickmansworth.

DALRYMPLE HOUSE, RICKMANSWORTH, HERTS.,

For the treatment of Gentlemen under the Act and privately. Established 1883 by an association of prominent medical men and others for the study of inebriety; profits, if any, are expended on the institution. Large secluded grounds on the banks of the river Colne. Full sized billiards, tennis, croquet, bowls. Golf (Moor Park and Sandy Lodge) close by.—Apply to F. S. D. HOGG, M.R.C.S., &c., Res. Med. Supt.

ALCOHOLISM, DRUG HABIT and NEURASTHENIA.

BAY MOUNT, PAIGNTON.

Ladies and Gentlemen treated in small Private Home
EXCELLENT RESULTS FROM MODERN TREATMENT.
SPLENDID CLIMATE. AMPLE AMUSEMENT.
MODERATE INCLUSIVE TERMS.
Prospectus, report, etc., from STANFORD PARK, M.B., Ch.B., Res. Med. Supt. *Phone: Paignton 5110.*

ALCOHOLISM, OTHER DRUG HABITS, and TROPICAL Ailments

THE HARE NURSING HOME

As founded and established by the late Dr. FRANCIS HARE, for 20 years Med. Supt. of The Norwood Sanatorium, and author of "Alcoholism," etc.; for the treatment of ALCOHOLISM, other Drug Habits, Insomnia, Neurasthenia, Functional Nervous Disorders, TROPICAL Ailments, etc.

"THE OLD HILL HOUSE," CHISLEHURST, KENT.

Terms Moderate. Quiet and pleasant situation.
Ladies and gentlemen admitted for treatment.
For prospectus, etc., write or phone, WALTER E. MASTERS, M.D., M.R.C.S., D.P.H., Barrister-at-law (Res. Med. Supt.).
Phone: Chislehurst 451. Telegrams: "Masters," Chislehurst.

FUNCTIONAL NERVOUS DISORDERS ALCOHOLISM and DRUG ADDICTION

at CALDECOTE HALL, NUNEATON.

This Mansion has been opened upon the most modern and scientific lines both physical and mental.
Resident Medical Superintendent—
A. E. CARVER, M.A., M.D., M.R.C.S., D.P.H., D.P.M.
Full particulars upon request.
Prospectus from the SECRETARY 40, Marsham Street, Westminster, S.W.

Telegraphic Address: "Relief, Old Catton." Telephone: 290 Norwich.

NERVOUS & MENTAL AFFECTIONS.

Ladies only received.

The Grove, Old Catton, Norwich.—A High-class Home for the Curative Treatment of Nervous Affections. Voluntary Boarders are also received without certificates.

For full particulars apply to the Misses MCLINTOCK, or to Dr. S. BARTON, 34, Surrey-street, Norwich, Visiting Physician.

PEEBLES HYDRO.

Beautifully situated 600 feet above sea level. Facing South, completely sheltered from North and East.
21 miles from Edinburgh.
All modern Baths, Douches, Massage and Electrical Treatment. Ultra-violet-Radiation. Physician in attendance.
IDEAL HEALTH RESORT.
Electric Light, Central Heating, Electric Lift, Three Billiard Tables, Ball Room, Winter Garden, Swimming Bath, Hard and Grass Tennis Courts, Badminton, Croquet Lawn, Golf Course.
Prospectus from Manager. 'Phone: Peebles 2.

SMEDLEY'S HYDRO.

MATLOCK. Established 1853.

Physicians: G. C. R. Harbinson, M.B., B.Ch.
R. MacLelland, M.D., C.M. (Edin.).
Prospectus and full information on application to the Manager.

BOURNEMOUTH HYDRO

Plombière Lavage, Electrical, Massage, and Thermal Treatment: Brine, Turkish, Nauheim, and Radiant Heat Baths.
DIATHERMY, ULTRA-VIOLET LIGHT.
Resident Physician—W. JOHNSON SMYTH, M.D. *Tel.* 341.

AN INVITATION
to visit
HARROGATE

MEMBERS of the Medical Profession are cordially invited to pay a visit to this BRITISH Spa.

Concessions available include the free use of the Baths and Waters, Golf, Concerts, &c.

Considerable reductions off Hotel Bills, Motor Coach Excursions, Tennis, &c.

Pullman and Fast Restaurant Car Trains daily from King's Cross Station, London.

For full details apply to F. J. C. Broome, General Manager, 2, The Royal Baths, Harrogate.

You cannot stay at a brighter place than the

GRAND HOTEL
HARROGATE.

Finest Cuisine. *Splendid Ballroom.*
Absolute Comfort. *Conri Tait's Band.*

200 rooms fitted with hot and cold water. 50 suites with private baths and telephones. Hard Tennis Courts. Putting Greens. Garage 100 cars.
Telegrams: "Grand." Telephone: Harrogate 4631.
Dancing Every Saturday.
Delightful Situation overlooking VALLEY GARDENS

CHEADLE ROYAL,

CHEADLE, CHESHIRE.

This Registered Hospital for Mental Diseases with its seaside branch Glan-y-don, Colwyn Bay, is for the treatment and care of PRIVATE PATIENTS of the UPPER and MIDDLE CLASSES. Voluntary Boarders received.

For terms, &c., apply to the Medical Superintendent, J. A. C. Roy, M.B., who may be seen in Manchester by appointment. Telephone: No. 481 GATLEY.

FEATHERSTONE HALL

SOUTHALL, MIDDLESEX.

A small PRIVATE HOME for the care and treatment of Ladies suffering from MENTAL DISORDERS. Voluntary Boarders received. Large Secluded Garden.
Apply to the Medical Superintendent. Tel.: Southall 0034.

CHISWICK HOUSE

A PRIVATE MENTAL HOSPITAL FOR THE TREATMENT AND CARE OF MENTAL AND NERVOUS DISORDERS.
Now removed to—

CHISWICK HOUSE, PINNER, MIDDLESEX.
Pinner 234.

A modern country house 12 miles from Marble Arch, in beautiful and secluded grounds.
Fees are from 10 guineas a week.
Voluntary Patients received for treatment.
DOUGLAS MACAULAY, M.D., D.P.M.

LITTLETON HALL, BRENTWOOD, ESSEX

(18 MILES FROM LONDON.)
400 feet above sea.
HOME for few LADIES Mentally Afflicted. Large grounds. Liverpool st. 26 min. Stations: Brentwood, Shenfield, one mile. Boarders Received. Apply Dr. Haynes. Telephone and Telegrams: Haynes Brentwood 45.

PORTSMOUTH CITY MENTAL HOSPITAL.

Accommodation is provided for the reception of PRIVATE PATIENTS of both sexes in three detached Villas, which are healthily & pleasantly situated in extensive grounds with sea views.
Charges from 3 guineas weekly, including all necessaries except clothing.—Apply to the Medical Superintendent and Resident Physician, THOMAS BEATON, O.B.E., M.D., M.R.C.P.

THE COPPICE, NOTTINGHAM,

HOSPITAL FOR MENTAL DISEASES.

President: The Right Hon. the EARL MANVERS.

This Institution is exclusively for the reception of a limited number of PRIVATE PATIENTS of both sexes, of the UPPER and MIDDLE CLASSES, at moderate rates of payment. It is beautifully situated in its own grounds, on an eminence a short distance from Nottingham, and commands an extensive view of the surrounding country; and from its singularly healthy position and comfortable arrangements affords every facility for the relief and cure of those mentally afflicted. For terms, &c., apply to the Medical Superintendent.

MALLING PLACE, KENT

For LADIES and GENTLEMEN of Unsound Mind.
Terms Moderate: Apply to Resident Medical Superintendent.
Telegrams: ADAM WEST MALLING. Telephone: No. 2 MALLING.

STRETTON HOUSE

Church Stretton, Shropshire.

A PRIVATE HOME for the treatment of gentlemen suffering from Mental and Nervous Illness including the allied Disorders of Alcoholism and the Drug Habit. All types of early Mental and Nervous Cases are received without certificates as Voluntary Boarders. Bracing hill country. See "Medical Directory," p. 2219.—Apply to Medical Superintendent. 'Phone 10 P.O., Church Stretton.

THE WARNEFORD, OXFORD.

HOSPITAL FOR MENTAL DISORDERS.

President: The Right Hon. the EARL OF JERSEY.

This Registered Hospital, for the Treatment and Care, at moderate charges, of Mental Patients belonging to the educated classes, stands in a healthy and pleasant situation on Headington Hill, near Oxford. Voluntary Boarders are also received for treatment.—For further particulars apply to the Medical Superintendent.

PRIVATE PATIENTS.

London County Council.—

Accommodation for Male Paying Patients is provided at the LONDON COUNTY MENTAL HOSPITAL, Claybury, Woodford Bridge, Essex.
The hospital is thoroughly equipped for modern treatment of certified cases.
Terms, exclusive of clothing and special luxuries, for patients having a legal settlement in the County of London, 44s. 11d. a week: for others, 48s. 5d. a week.
Full particulars from the Medical Superintendent, Claybury Mental Hospital, or from the Acting Chief Officer, Mental Hospitals Department, The County Hall, S.E.1.

Grove House, All Stretton, Church STRETTON, SHROPSHIRE.

A PRIVATE HOME for the care and treatment of a limited number of Ladies Mentally Afflicted.
Climate healthy and bracing.
Apply to Dr. McClintock, Proprietor and Resident Medical Superintendent.

Evelina Hospital for Children,

Southwark, S.E.—The Committee of Management requires a HOUSE SURGEON (Male) for seven months from 12th July (during first three months duty in Casualty and O.P. Dept.). Salary at £120 per annum, with board and residence.
Candidates (duly registered) to send applications, giving age and qualifications (with dates), and copies of four testimonials, to the Secretary at the Hospital before 7th July.
Applicants will be informed if they will be interviewed by the Medical Committee. Selected candidates must attend Committee of Management. Time and place of meeting will be notified by the undersigned, from whom rules and other particulars relating to the post must be obtained.
By order of Committee of Management.
H. C. S. SMITH,
23rd June, 1930. Secretary-Superintendent.

The Hospital for Sick Children,

Great Ormond-street, London, W.C.1.

A MEDICAL REGISTRAR AND PATHOLOGIST is required on the 1st October, 1930.
Gentlemen are invited to send in their applications, addressed to the Secretary, with copies of not more than three testimonials written specially for the purpose, before 12 o'clock on Monday, the 14th July, 1930.
The appointment is made for one year, but may be held, subject to re-election, for three years.
Salary £300 per annum, with luncheon and dinner when on duty, and an allowance of eighteen guineas for the purpose of providing a substitute during annual leave.
Candidates must be registered Medical Men, and must have held a responsible Hospital appointment, and be prepared to take up the duties on the 1st October, 1930.
All candidates must be in attendance at the Hospital to appear before the Joint Committee, if necessary, on Wednesday, the 16th July, 1930, at 4.45 P.M.
Forms of application and copies of the Rules for, and details of the duties of, the appointment will be supplied on application to the Secretary. By order of the Board of Management.
June, 1930. JAMES MCKAY, Secretary.

West London Hospital, Hammersmith,

W. 6. (234 Beds.)

Applications are invited for the post of RESIDENT ASSISTANT PHYSICIAN at the above Hospital, duties to commence at once. Candidates must be unmarried and duly registered Medical Practitioners and must have held the post of House Physician at a General Hospital.
Preference will be given to candidates who hold the Diploma of M.R.C.P. As Senior Resident Officer he will be responsible for certain administrative duties, and later those of Medical Registrar and such duties in connexion with the Post-Graduate College as the Board may approve.
The appointment is for one year, but the holder shall be eligible for re-election annually up to a maximum period of three years. Salary at the rate of £300 per annum (plus £25 p.a. for services in connexion with the Venereal Diseases Department), with board and residence. The appointment may be terminated by one month's notice on either side.
Candidates are required to send to me seven copies of their application and testimonials, also to send a copy to, and to call upon, each member of the Medical Council. Applications must reach me not later than first post on 11th July. Candidates must attend a Meeting of the Medical Council at 4.30 P.M. on Friday, 18th July. Selected candidates will be required to attend the Board of Management at 5 P.M. on Tuesday, 22nd July, when the appointment will be made.
H. A. MADGE, Secretary.

King George Hospital, Ilford.

Applications are invited for the appointment of HONORARY NEUROLOGIST to the Hospital. Further information may be obtained from the undersigned, to whom applications should be sent not later than 20th July, 1930.

G. AUSTIN HEPWORTH, Secretary.

The Royal Waterloo Hospital for CHILDREN AND WOMEN, Waterloo-road, S.E.1.

Applications are invited from qualified Male Practitioners for the following post, vacant on the 1st August, 1930, a CASUALTY OFFICER to work in the Out-patient Department on weekdays at £150 per annum, lunch and tea provided. Applications, with copies of testimonials, should be forwarded by Tuesday morning, July 22nd, to the Secretary at the Hospital, from whom further particulars can be obtained.

West End Hospital for Nervous DISEASES

(In-patient Dept.: Gloucester Gate, Regent's Park, N.W.1).

The Committee of Management invites applications from British Male candidates for the vacancy of JUNIOR HOUSE PHYSICIAN to start duty August 1st. Salary £100, with board, residence, and laundry. Appointment in first instance for six months. Applications, with copies of three testimonials, must be received by the undersigned not later than July 15th.

73, Welbeck-street, W.1. J. P. WETENHALL, Secretary.

Poplar Hospital for Accidents,

East India Dock-road, Poplar, E.14.

The Committee invites applications for the appointment of SECOND RESIDENT OFFICER at a salary at the rate of £175 per annum, all found. Candidates must have held appointments as House Surgeon at a Hospital. Applications must be accompanied by a statement of the candidate's qualifications, and be forwarded to the Secretary, with three recent testimonials, not later than Thursday, July 10th, 1930. The appointment is for a period of six months.

Hospital for Consumption and Diseases OF THE CHEST, Brompton, S.W.3.

The Committee of Management invite applications for the post of HOUSE PHYSICIAN (for which there are three vacancies). The duties include work in the Out-patient Department as well as in the Wards. Applications, with copies of testimonials, must reach the undersigned not later than Saturday, 12th July. The appointment is for six months, commencing on 1st August, with an honorarium of £50. FREDERICK WOOD, Secretary.

Brompton, 28th June, 1930.

The Queen's Hospital for Children,

Hackney-road, London, E.2.
Telephone: Bishopsgate 6305 and 2534.

CLINICAL ASSISTANT required in the Orthopædic Department. Attendance every Thursday at 1.30 P.M. Lunch provided. Honorarium of 5s. per attendance to cover expenses. Applications, stating age, qualifications, and experience, should be addressed to the Secretary at the Hospital, and should be delivered on or before 10th July.

17th June, 1930. T. GLENTON-KERR, Secretary.

Prison Medical Service.

Applications are invited for the post of MEDICAL OFFICER, CLASS II, in the above service. Salary £350, rising by £20 per annum to £600 with quarters, or an allowance in lieu. The pay is subject to a bonus, which at present on a salary of £350 is £135 8s. These posts are pensionable, and there are prospects of promotion to higher rank.

Candidates must be fully qualified and registered. Preference will be given to those who have held house appointments, have had experience in Lunacy and Psychological methods, and are under the age of thirty. Forms of application can be obtained from the Secretary, Staff Branch, Prison Commission, Home Office, London, S.W.1.

£350 SURGICAL SCHOLARSHIP.

The Association of Surgeons of Great Britain and Ireland

invite applications for a SURGICAL SCHOLARSHIP of the value of £350, to be held for one year. The object of the Scholarship is to enable the holder to pursue a definite line of research or to study in specified clinics, either at home or abroad.

Candidates in their applications are required to state the line of research or study that they intend to pursue and also to give a résumé of their past careers. No testimonials should be sent, but each candidate is required to provide letters of recommendation, to be forwarded under separate cover, from two sponsors.

The election will be made in November, 1930, and applications must be forwarded to the Secretary of the Association by September 30th, 1930. E. C. HUGHES, Hon. Secretary.

The Association of Surgeons, 17, Wimpole-street, London, W.1.

Miller General Hospital,

Greenwich-road, S.E. 10.

CASUALTY OFFICER (Male and unmarried) required. There are four other residents. Salary £150 per annum, with board, residence, and laundry. Duties to commence on or as soon after the 1st of July as possible.

Applications, stating age, nationality, qualifications, and experience, accompanied by copies of not more than three recent testimonials, to be sent to the Secretary as soon as possible.

June 18th, 1930.

British Red Cross Society.

CLINIC FOR RHEUMATISM,
Peto-place, Marylebone-road, N.W.1.

The British Red Cross Society invite applications for the following Honorary appointments to the Clinic for Rheumatism, Peto-place, Marylebone-road, N.W.1: Honorary Consulting Surgeon, Honorary Consulting Orthopædic Surgeon, Honorary Consulting Laryngologist, Honorary Consulting Gynæcologist, Honorary Consulting Radiologist, Honorary Consulting Dental Surgeon.

Applications, stating qualifications and present appointment, should be sent in not later than Tuesday, 15th July, 1930, addressed to The Secretary of the Medical Committee, Clinic for Rheumatism, British Red Cross Society, 14, Grosvenor-crescent, S.W.1.

All Saints' Hospital (for Genito-URINARY DISEASES).

In-patient Dept.: 91, Finchley-road, N.W.8.
Out-patient Dept. and Secretary's Office:
49–55, Vauxhall Bridge-road, S.W.1.

Applications are invited for the following post, and candidates are requested to send particulars of their experience, qualifications, and copies of recent testimonials not later than 19th July, 1930.

HONORARY SURGICAL REGISTRAR. The appointment is tenable for a period of twelve months, with renewal up to a maximum of two years, subject to the discretion of the Board of Management. Applicants should be Fellows of the Royal College of Surgeons and not be engaged in general practice.

D. H. EADE, Secretary.

Ministry of Health.

The Minister of Health invites applications from registered Medical Practitioners for appointment as BACTERIOLOGIST at the GOVERNMENT LYMPH ESTABLISHMENT at Hendon.

The salary commences at £700 per annum, and rises by annual increments of £25 to £1000 per annum. In addition to the salary a bonus, which varies with the cost of living, is payable; the bonus on the minimum salary is at present £187 and is next subject to revision on the 29th September, 1930.

The appointment will carry the usual Civil Service conditions as to pension, holidays, &c., and the Bacteriologist will be required to devote his whole time to the public service.

Candidates must be registered medical men of not less than seven years' standing.

Canvassing Members of Parliament or Officers of the Ministry will render the candidate liable to disqualification.

Forms of application, with further particulars of the appointment, may be obtained from the Director of Establishments, Ministry of Health, Whitehall, S.W.1.

No application can be considered unless received on the prescribed form not later than the 14th July, 1930.

County Council of Middlesex.

ASSISTANT MEDICAL OFFICER.

The County Council invites applications for the post of an Assistant Medical Officer in the Public Health and School Medical Department. Applicants must be duly qualified registered Medical Practitioners.

The duties of the post are the medical inspection of school children, the supervision of treatment of minor ailments, the carrying out of work under the Maternity and Child Welfare Scheme, and such other duties as may be required by the Council. The officer appointed must devote whole time to the duties of the post, will act under the supervision and control of the County Medical Officer of Health, and must reside in such district as may be required by the County Council.

Salary at the rate of £600 per annum, rising after two years' service by yearly increments of £30 to £750 (no bonus). Reasonable travelling expenses allowed.

The successful candidate will be required to contribute to the County Council's Superannuation Fund and to pass such medical examination as the County Council may direct.

The appointment will be during the pleasure of the Council, and subject to one month's notice on either side.

Applications, stating (1) age, (2) qualifications, and (3) previous experience, together with copies of not more than three recent testimonials, must be received by the undersigned not later than 12th July, 1930. No special application forms are provided. Envelopes must be endorsed "Assistant Medical Officer."

Canvassing, directly or indirectly, will be a disqualification.

ERNEST S. W. HART, Clerk of the County Council.

Middlesex Guildhall, Westminster, S.W.1, 24th June, 1930.

National Hospital, Queen-square.

for the Relief and Cure of Diseases of the Nervous System, including Paralysis and Epilepsy, W.C.1.

HOUSE PHYSICIAN.

The Board of Management invite applications for the post of House Physician, which should be sent to the undersigned, accompanied by copies of three recent testimonials, not later than Monday, July 21st. The salary is £150 per annum, with board and lodging. GODFREY H. HAMILTON, Secretary.

St. John's Hospital, Lewisham, S.E.13.

Applications are invited for the appointment of RESIDENT MEDICAL OFFICER. The appointment is for one year from the 1st of August. Salary £250 per annum, with board, residence, laundry, and certain fees. Preference will be given to candidates with experience in Surgery. Applications, with copies of testimonials, should reach the Secretary at the Hospital not later than Monday, July 21st. The Selection Committee will sit on July 22nd at 4.45 P.M.

St. John's Hospital, Lewisham, S.E.13.

Applications are invited for the appointment of HONORARY SURGEON to the Hospital. The successful candidate will, in addition to taking charge of beds, attend the Out-patient Department once weekly, and assist in the surgical lectures to nurses. A residential qualification may be insisted on. Applications, with copies of testimonials, should reach the Secretary at the Hospital not later than Monday, July 21st. The Selection Committee will sit on July 22nd at 4.45 P.M.

Central London Ophthalmic Hospital,

Judd-street, St. Pancras, W.C.1.

There are vacancies for the posts of SENIOR and JUNIOR HOUSE SURGEON. Salaries at the rate of £120 and £100 per annum respectively, with board and residence in the Hospital.

Applications, with testimonials, from duly qualified candidates, must be sent to the undersigned on or before July 7th.

H. R. S. DRUCE, Secretary.

Charing Cross Hospital.

RESIDENT ANÆSTHETIST.

Applications are invited for those possessing registered qualifications for the above post.

The appointment will be made for the term of six months, and the holder will be eligible for re-election. Salary at the rate of £100 per annum.

Copies of the rules relating to the office can be obtained from the undersigned, to whom applications, with copies of two recent testimonials bearing witness to the candidate's experience in the administration of anæsthetics must be delivered not later than Wednesday next, the 9th instant, to: PHILIP INMAN, House Governor, Charing Cross Hospital, London, W.C.2.

Bolingbroke Hospital (121 Beds),

Wandsworth-common, S.W.11.

HOUSE PHYSICIAN (Male) required. The appointment is for six months, commencing on the 1st August next. Salary £120 per annum, with board, residence, and laundry.

Candidates must be fully qualified and registered.

Applications, stating age, qualifications, and experience, with copies of not more than three recent testimonials, should be sent to the undersigned on or before the 9th July, 1930.

W. S. RANDOLPH BISS, Secretary-Superintendent.

Bolingbroke Hospital (121 Beds),

Wandsworth-common, S.W.11.

Applications are invited for the post of RESIDENT MEDICAL OFFICER (Male).

The post is that of Senior Resident Officer, and the work being chiefly surgical preference will be given to candidates holding the F.R.C.S. qualification.

The appointment is for twelve months.

Salary £200 per annum, with board, residence, and laundry.

Applications, stating age, qualifications, and experience, with copies of not more than three testimonials, should be sent to the undersigned at once.

W. S. RANDOLPH BISS, Secretary-Superintendent.

Administrative County of London.

The London County Council invites applications for the position of DEPUTY MEDICAL SUPERINTENDENT in the Public Health Department, for duty at MILE END HOSPITAL, Bancroft-road, E.1. Candidates must be qualified by law to practise both medicine and surgery in England. The provisional scale of salary attaching to the position is £600 a year, with board, lodging, and laundry. The salary and conditions of service are subject to review.

Application forms, containing full details, obtainable (stamped addressed foolscap envelope necessary) from the Clerk of the Council, the County Hall, Westminster Bridge, S.E.1, to whom they must be returned by Friday, 11th July, 1930. Canvassing disqualifies.

MONTAGUE H. COX,
Clerk of the London County Council.

The Weir Hospital, Grove-road,

Balham, S.W.12.

JUNIOR RESIDENT MEDICAL OFFICER (Male, unmarried) required the 19th July. Candidates must be fully qualified and duly registered. Salary £150 per annum, with board, residence, and laundry. Applications, with copies of testimonials, to be sent to the Secretary, from whom further information may be obtained.

St. Thomas's Hospital.

VACANCY.

Applications are invited for the post of JUNIOR ASSISTANT in the Venereal Department at this Hospital. Salary at the rate of £250 per annum. The appointment to date from 2nd August. Applications and testimonials should be sent in to the Secretary of the Hospital on or before 19th July, 1930.

Royal College of Surgeons of England.

ELECTION OF EXAMINER IN DENTAL SURGERY.

Notice is hereby given that the Council on July 31st will proceed to the election of a Member of the Board of Examiners in Dental Surgery in the vacancy occasioned by the retirement of Mr. Evelyn Sprawson.

Persons duly registered under the Dentists' Acts, 1878–1923, desirous of being elected should make application in writing to the Secretary on or before Tuesday, July 22nd.

5th July, 1930. S. FORREST COWELL, Secretary.

Kensington, Fulham, and Chelsea

GENERAL HOSPITAL, 194, Finborough-road, Earl's-court, S.W.10.

The Board of Management invite applications from fully qualified practitioners for the post of CASUALTY (RESIDENT) MEDICAL OFFICER. This Hospital, the In-Patient Department of which is in process of rebuilding, has an extensive Out-Patient Department still working and General and Special Out-Patient Clinics. The appointment to be held for six months from July 21st. Salary £100 p.a. Applications, accompanied by copies of three testimonials, should be forwarded to the undersigned not later than July 15th.

L. MAY NORTON, Superintendent.

Croydon General Hospital. — A

vacancy occurs on the Honorary Staff of the above Hospital for an ANÆSTHETIST. Candidates for the appointment are requested to send their applications and testimonials, together with statements of their qualifications and experience, to me not later than first post on the 10th July, 1930.

30th June, 1930. GEORGE H. DAMS, Secretary.

Manchester Royal Eye Hospital.

JUNIOR HOUSE SURGEON required. Salary £120 per annum, with residence, board, &c. Applications (with copies of testimonials), endorsed "House Surgeon," to be addressed to the Chairman of the Board of Management not later than the 18th July, 1930. H. R. NORTH, Secretary.

Salford Royal Hospital (263 Beds).

Applications are invited for the following vacancies in the Resident Medical Staff (Male):—

HOUSE PHYSICIAN. Salary at the rate of £125 per annum.

CASUALTY HOUSE SURGEON. Salary at the rate of £125 per annum.

The appointments are for a period of six months, with board and residence.

Candidates must be registered under the Medical Acts.

The Hospital has the approval of the Royal College of Surgeons of England and appointments here are recognised for the English Fellowship (Final).

Forms of application, which may be obtained from the undersigned, must be delivered without delay.

By order of the Board.

GEORGE RUDDLE, General Superintendent and Secretary.

Salford Royal Hospital, June 30th, 1930.

The Royal Hospital, Wolverhampton.

(Incorporated under Charter.)

CASUALTY OFFICER AND HOUSE SURGEON to Ear, Throat, and Nose Department (Male) required. Duties to commence forthwith.

The Hospital contains 240 beds, contains the usual special departments, and is recognised by the various Examining Bodies for a part of the requisite attendance on Medical and Surgical practice.

Candidates must be registered under the Medical Acts, and unmarried.

The appointment is for six months, with eligibility for further appointment for six months as House Surgeon to In-patients.

Salary at the rate of £125 per annum, board, furnished rooms, and laundry provided.

Applications, with copies of testimonials, to be forwarded to the undersigned. W. H. HARPER,

18th June, 1930. House Governor and Secretary.

Royal Aberdeen Hospital for Sick CHILDREN.

Wanted, ONE RESIDENT HOUSE PHYSICIAN and TWO RESIDENT HOUSE SURGEONS (one vacancy to be filled by a lady), to commence duties on 1st August, 1930. The appointments are to be for six months, and may be continued for a further period of six months, if desired, and recommended by the Medical Staff. Candidates are requested to call on the Senior Members of the Honorary Medical Staff. Applications, accompanied by one copy of testimonials, to be lodged on or before 9th July, 1930, with Mr. A. S. R. BRUCE, 12, Dee-street, Aberdeen

Royal Aberdeen Hospital for Sick CHILDREN.

Applications are invited for the post of HONORARY ASSISTANT SURGEON to the Ear, Nose and Throat Department, to commence duties on 1st August, 1930. These, along with one copy of testimonials, should be lodged with the Honorary Secretary, Mr. A. S. R. BRUCE, 12, Dee-street, Aberdeen, on or before 21st July, 1930.

David Lewis Northern Hospital. (CLINICAL SCHOOL.)

Applications are invited for the posts of One MEDICAL TUTOR AND REGISTRAR, Two SURGICAL TUTORS AND REGISTRARS to the above Hospital from October 1st, 1930, to March 31st, 1931.

Remuneration £175 per annum.

Applications, with testimonials, to be sent to the Honorary Secretary, Medical Board, on or before the 12th of July.

H. LEVEY, Secretary-Superintendent.

David Lewis Northern Hospital.

Applications are invited for the following Resident posts for the period October 1st, 1930, to March 31st, 1931.

Four HOUSE SURGEONS.

Two HOUSE PHYSICIANS.

Remuneration £100 per annum. Applications, together with testimonials, to be sent to the Honorary Secretary of the Medical Board not later than July 12th, 1930.

H. LEVEY, Secretary-Superintendent.

Lincoln County Hospital.

Wanted, a JUNIOR HOUSE SURGEON, Male, unmarried. Salary at the rate of £150 per annum, rising to £200 per annum at the conclusion of six months' approved service.

Every candidate for the appointment must be registered under the Medical Acts.

Applications, stating age and other particulars, with copies of testimonials (not more than three), are to be sent to the undersigned, from whom further particulars may be obtained.

ARTHUR MOORE, Secretary-Superintendent.

Lincoln, 30th June, 1930.

The Guest Hospital and Eye INFIRMARY, Dudley. (General Hospital, 104 Beds.)

Applications are invited for the post of ASSISTANT HOUSE SURGEON. Salary £150 per annum, according to experience, with furnished apartments, board, and laundry. Candidates must be fully qualified and registered. Applications, stating age, qualifications, and experience, and accompanied by copies of testimonials, to be sent to the undersigned.

H. RAYMOND HURST, Secretary.

The Guest Hospital, Dudley, June 30th, 1930.

Manchester Northern Hospital FOR WOMEN AND CHILDREN, Park-place, Cheetham Hill-road, Manchester.

The Committee of Management require the services of a SENIOR HOUSE SURGEON and JUNIOR HOUSE SURGEON, both duly qualified, who are required to commence duty as soon as possible.

Senior House Surgeon, salary £130 per annum, with board and residence: Junior House Surgeon, salary £100 per annum, with board only.

Applications, stating age, experience, and date available, with copies of recent testimonials, to be sent to the Secretary, Mr. JAMES C. DANIELS, 38, Barton-arcade, Manchester.

Beckett Hospital and Dispensary, Barnsley.

The Committee invite applications for the post of HOUSE PHYSICIAN. Applicants must be registered and hold a Medical and Surgical qualification, and preference will be given to applicants who have held a previous Hospital post and having pathological experience.

Salary £200 per annum, with board, residence, and laundry.

Applications, together with testimonials, should be sent to the undersigned immediately.

ARTHUR L. BOURNE, Secretary-Superintendent.

1st July, 1930.

Taunton and Somerset Hospital (104 Beds), Taunton.

JUNIOR HOUSE SURGEON (Male) required. Two other Resident Officers. Appointment for six calendar months. Salary at the rate of £100 per annum, with board, residence, and laundry.

Applications, with testimonials, to F. J. J. STACEY, Secretary.

Royal Hampshire County Hospital, Winchester.

HOUSE PHYSICIAN.

Applications are invited from fully qualified men for the above post. Salary £150 per annum, with board, residence, and laundry. Candidates, who must be of British nationality, should make application at once to the undersigned, enclosing copies of three testimonials.

24th June, 1930. HERBERT MASLEN, Secretary.

The Jessop Hospital for Women, Sheffield. (146 Beds.)

GYNÆCOLOGICAL AND MATERNITY DEPARTMENTS.

Applications are invited for the post of REGISTRAR AND OBSTETRICAL TUTOR. The appointment is whole time, non-resident, and includes antenatal work, teaching of students, together with Registrar's duties. Salary £500 per annum.

Applications, together with copies of recent testimonials, should reach the undersigned on or before July 22nd.

H. B. SHELSWELL, Secretary.

South Devon and East Cornwall HOSPITAL, Plymouth. (240 Beds.)

HOUSE SURGEON (MALE).

Salary £100 per annum, with board, residence, and laundry. Appointment is tenable for six months and subject to renewal. Candidates must be registered under the Medical Acts.

Applications, stating age and qualifications, together with copies of recent testimonials, to reach the undersigned by 12th July, 1930. Duties to commence at once.

ARTHUR R. CASH, General Superintendent and Secretary.

16th June, 1930.

Royal Infirmary, Blackburn. (240 Beds, 5 Residents.)

RESIDENT HOUSE PHYSICIAN (Male) required at a salary of £175 per annum, with board, residence, laundry, &c. In addition to Medical Wards, to be attached to Eye, Ear, Nose, and Throat Department. To commence duties as early as possible.

Applications, with copies of testimonials, stating age, nationality, experience, &c., to be sent at once to the undersigned.

NATHAN A. SMITH, General Superintendent and Secretary.

Royal Infirmary, Blackburn.

This Institution is recognised for the Surgical practice required for the F.R.C.S. Final Examination.

Manchester Royal Infirmary, Central Branch, Roby-street, Manchester.

JUNIOR HOUSE SURGEON AND CASUALTY OFFICER (LADY).

The Board of Management of the Manchester Royal Infirmary invite applications for the above appointment.

Applicants must be registered and hold a Medical and Surgical qualification.

The appointment is subject to one month's notice in writing from or to the Board and is tenable for an indefinite period from 1st August, 1930. Commencing salary £100 per annum, together with board and allowance for laundry.

Applicants must state age and qualifications and send twelve copies of their application and testimonials to the undersigned by 9 A.M. on Thursday, 17th July, 1930.

By order.

FRANK G. HAZELL, General Superintendent and Secretary.

City and County of Newcastle-upon-TYNE.

CITY HOSPITAL FOR INFECTIOUS DISEASES.

RESIDENT MEDICAL ASSISTANT (MALE).

Wanted immediately, a Resident Medical Assistant (Male), who holds a registrable qualification in Medicine and Surgery (and preferably also in Public Health), and possesses a practical knowledge of Bacteriology. The holding of a previous resident appointment and some experience of general practice will be considered a recommendation.

Salary £350 per annum, with board, lodging, &c.

Applications, stating age, qualifications, and previous experience, to be forwarded, with copies of not more than three recent testimonials, to the Medical Officer of Health, Town Hall, Newcastle-upon-Tyne.

23rd June, 1930.

Wrexham and East Denbighshire War MEMORIAL HOSPITAL. (109 Beds.)

Two RESIDENT HOUSE SURGEONS (Male or Female) required at above Hospital, to commence on August 1st. Appointments for a period of not less than six months. Salaries £150 per annum, with board and laundry.

Applications, stating age, nationality, experience, and qualifications, accompanied by copies of three recent testimonials, to be sent to the undersigned not later than Friday, July 18th.

LESLIE SPENCER, Secretary.

Norfolk and Norwich Hospital, Norwich.

Applications are invited for the post of HOUSE SURGEON. Salary £120 per annum, with board, residence, and laundry. Preference will be given to a candidate who has held a previous Hospital appointment. Candidates (Male) who must possess registered qualifications, should forward applications, stating age, nationality, &c., together with copies of testimonials, to the undersigned not later than Tuesday, 8th July, 1930.

FRANK INCH, House Governor and Secretary.

27th June, 1930.

The Gloucestershire Royal Infirmary AND EYE INSTITUTION, Gloucester. (153 Beds.)

Applications are invited for the posts of HOUSE PHYSICIAN (Male), and SECOND HOUSE SURGEON (Male). Salaries £135 and £100 per annum, respectively, with board, residence, and laundry. (Four Resident Medical Officers.)

The appointments are for six months, which may be extended for similar periods by re-election from time to time.

Applications, stating age, qualifications, and nationality, with copies of not less than three recent testimonials, must be sent to the undersigned. The elected candidates will be required to enter upon their duties at once. F. J. SYMONS, Secretary.

June 26th, 1930.

Ministry of Pensions.

BIRMINGHAM PENSIONS HOSPITAL COMMITTEE.

HIGHBURY HOSPITAL, MOSELEY, BIRMINGHAM.

Applications are invited for the post of RESIDENT ASSISTANT MEDICAL OFFICER at the above Hospital.

The cases treated are Surgical (mainly Orthopædic) and Medical. Salary £300 per annum, with lodging, fuel, and light. The appointed candidate to be prepared to take up duty early in August.

Candidates selected for interview will be required to pay their travelling expenses. Applications, stating age, experience, and War service (if any), together with copies of recent testimonials, to be received not later than Tuesday, 15th July, addressed to Chairman of the Committee, Highbury Hospital, Moseley, Birmingham.

City of Manchester Education COMMITTEE.

ASSISTANT SCHOOL MEDICAL OFFICER.

Applications are invited from fully qualified Medical Practitioners for the post of Assistant School Medical Officer.

Applicants must have been qualified three years and will be required to devote their whole time to the duties of the office. Preference will be given to those who have special knowledge in the diagnosis and treatment of Diseases of the Ear, and experience in the prescription of spectacles.

The salary is £600 per annum, rising by yearly increments of £25 to a maximum of £750. There is also a yearly allowance of £10 for travelling expenses.

The person appointed will be required to contribute to the Superannuation Scheme of the Corporation.

Forms of application may be obtained from the undersigned, and applications should be returned not later than Saturday, 12th July, 1930.

GEORGE GUEST, Acting Director of Education.

Education Offices, Deansgate, Manchester.

APPOINTMENT OF A REGISTERED MEDICAL MAN OR WOMAN AS A CLINICAL RESEARCH WORKER IN MENTAL DEFICIENCY.

The Medical Research Council,

the GOVERNING BODY OF THE DARWIN TRUST, and the COMMITTEE OF THE ROYAL EASTERN COUNTIES' INSTITUTION FOR THE MENTALLY DEFECTIVE at Colchester, jointly invite applications from registered Medical Men or Women to undertake research into Mental Deficiency.

The person appointed will be a member of the Medical Staff of the Royal Eastern Counties' Institution, and will be expected to take some part in the Administrative and Clinical work of the Institution itself, but the major part of the work will be an investigation into the causes of mental deficiency from the clinical, social, and genetic aspects. A Social Investigator will be appointed to assist in the work.

Commencing salary at the rate of £600 a year, non-resident.

A form of application can be obtained from Miss DARWIN, The Orchard, Huntingdon-road, Cambridge, which must be completed and returned to her before the 14th July. Duties to commence 1st October, 1930.

Leeds Public Dispensary.—Wanted,

JUNIOR RESIDENT MEDICAL OFFICER. Salary £150 per annum, with board, residence, and four shillings weekly for laundry. Separate sitting-room. Applications, with copies of three recent testimonials, to be addressed to the Secretary of the Faculty, Public Dispensary, North-street, Leeds.

City of Plymouth.

MEDICAL SUPERINTENDENT.

AMENDED ADVERTISEMENT.

Applications are invited from duly qualified and registered Medical Practitioners for the post of Medical Superintendent of the PLYMOUTH CITY HOSPITAL.

The salary will be at the rate of £1000 per year, with an allowance of the sum of £250 in lieu of quarters, &c. No canvassing for this appointment is permitted, and any canvassing will disqualify the applicant. The appointment will be terminable by three months' notice on either side.

Personal experience in Hospital administration is essential. The appointment is whole time and private practice is not permitted. The person appointed will be an Assistant Medical Officer in the Public Health Department, and will be on the staff of the Medical Officer of Health, who is the General Medical Superintendent of the Corporation Hospitals.

Applications will be considered only on the forms of application which will be provided. A form of application, together with further details relating to the appointment, can be obtained from the undersigned, on receipt by him of a request for this, accompanied by a stamped and addressed foolscap envelope. Forms of application, duly completed, together with copies of not more than three recent testimonials, must be returned to the undersigned not later than Saturday, 12th July, 1930.

A. T. NANKIVELL, M.D., M.R.C.P., D.P.H., &c.,
Medical Officer of Health.

Town Hall, Stonehouse, Plymouth, 21st June, 1930.

County Borough of Bolton.

EDUCATION COMMITTEE.

ASSISTANT MEDICAL OFFICER OF HEALTH AND ASSISTANT SCHOOL MEDICAL OFFICER.

The Education Committee invite applications for the appointment of a Male Assistant Medical Officer of Health and Assistant School Medical Officer.

The person appointed will be required to assist the School Medical Officer in carrying out the work of the medical examination of school-children under the Education Act, 1921, and also, when not required in school work, to assist the Medical Officer of Health in Public Health work, if required so to do. He must be prepared to devote the whole of his time to the duties of the office and not engage in private practice.

Preference will be given to applicants who

(*a*) have had some definite experience in School Hygiene; and

(*b*) have enjoyed special opportunities for the study of children.

The possession of a Diploma in Public Health is essential.

Salary £500 per annum, rising by £25 per annum to a maximum of £700 per annum in accordance with the national scale.

Applications, endorsed "Assistant Medical Officer," stating age, qualifications, and previous experience, and accompanied by not more than three recent testimonials, must be sent to the undersigned not later than Saturday, 12th July, 1930.

Canvassing, either directly or indirectly, will be a disqualification. F. WILKINSON, Director of Education.

Education Offices, Nelson-square, Bolton, Lancs.

Rhondda Urban District Council.

ASSISTANT MEDICAL OFFICER.

The above Council invite applications from Male registered Medical Practitioners to act as whole-time Assistant Medical Officer of Health and Assistant School Medical Officer, under the direction, supervision, and control of the Council's Medical Officer of Health, at a salary of £500, rising by annual increments of £25 to £700 a year, together with travelling expenses necessarily incurred in the performance of the duties.

Candidates must have had not less than three years' professional experience subsequent to registration, and the possession of a Diploma in Public Health is desirable.

The duties will pertain to both public health and school medical services, but experience in the work of school clinics, including the examination and certification of defective children, orthopædic work, X ray and ultra-violet radiation, and general anæsthesia for dental and throat operations will be considered to be of special importance.

The appointment will be subject to two calendar months' notice on either side, and to the approval of the Board of Education. The officer appointed will be required to reside within the Rhondda Urban District and will not be allowed to engage in private practice.

The selected candidate may be required to pass a medical examination, and should the position become a designated post under the Local Government and Other Officers' Superannuation Act, 1922, during the tenure of the successful applicant, the necessary deductions will be made from the salary.

Applications are to be made on forms obtainable from the Medical Officer of Health, Tydfil House, Llewelyn-street, Pentre, Rhondda, by whom they must be received, endorsed "Assistant Medical Officer," and accompanied by copies of three recent testimonials, not later than the first post on Tuesday, the 8th July, 1930. D. J. JONES, Clerk of the Council.

The Council Offices, Pentre, Rhondda, 24th June, 1930.

Newark General Hospital

(50 beds).—Wanted, a fully qualified RESIDENT HOUSE SURGEON (Male or Female, unmarried). Salary £150 per annum, with board, residence, and laundry. Appointment for six months or twelve if mutually desired. For form of application apply to W. T. Crampton, 27, Kirk Gate, Newark, Notts.

Royal Salop Infirmary, Shrewsbury.

(150 Beds.)

APPOINTMENT OF RESIDENT SURGICAL OFFICER.

Applications are invited from fully qualified men for the appointment of Resident Surgical Officer, vacant immediately. The appointment is for a period of twelve months, at a salary of £200 per annum, with board, residence, &c.

The Resident Surgical Officer is Senior Resident Officer of the Hospital. House Staff comprises House Physician and House Surgeon.

Applications, stating age, qualifications, experience, nationality, and accompanied by copies of three recent testimonials, to be sent to the undersigned. J. W. NOBLE,
June 21st, 1930. Secretary-Superintendent.

The Royal Infirmary, Sheffield.

(500 Beds.)

The Weekly Board of Management invite applications for the post of HOUSE SURGEON.

The salary attached to the appointment (which will terminate on 30th September next) is £80 per annum, with board and residence.

Applications, with copies of testimonials, should be addressed to the undersigned forthwith.

JNO. W. BARNES, F.C.I.S.,
General Superintendent and Secretary.
Board Room, 14th May, 1930.

The Royal Infirmary, Sheffield.

(500 Beds.)

The Weekly Board of Management invite applications for the undermentioned posts:—

Two HOUSE SURGEONS.

One OPHTHALMIC HOUSE SURGEON.

The appointments will be tenable for a period ending 31st Dec., 1930. The salary attached to each post is £80 per annum, rising after six months' service to £100 per annum, together with board and residence.

Applications, together with copies of testimonials, to be sent to the undersigned immediately.

JNO. W. BARNES, F.C.I.S.,
General Superintendent and Secretary.
Board Room, 30th June, 1930.

Lancashire County Council.

BIDDULPH GRANGE ORTHOPÆDIC HOSPITAL.

The Lancashire County Council invite applications for the post of RADIOGRAPHER (non-resident) at the above Hospital.

The salary to be paid is £200 per annum, together with part board. Indoor uniform will also be provided after one month's service.

Candidates should possess a certificate in Radiography from the Society of Radiographers or from an approved training school.

The person appointed must be prepared to carry out such other duties in addition to Radiography as may be required.

The person appointed will be required to pass a medical examination and to contribute towards the Council's Superannuation Scheme.

The appointment will be terminable by one month's notice on either side.

Applications, stating age, full details of previous and present appointments and experience, certificates held, &c., and accompanied by copies of two recent testimonials, are to be sent to the Secretary, Biddulph Grange Orthopædic Hospital, nr. Stoke-on-Trent, not later than the 14th July, 1930. Envelopes should be endorse "Radiographer."

J. J. BUTTERWORTH,
County Medical Officer of Health and School Medical Officer.
Preston.

Lancashire County Council.

BIDDULPH GRANGE ORTHOPÆDIC HOSPITAL.

Applications are invited for the post of JUNIOR HOUSE SURGEON (Woman) at the above Hospital which contains 87 beds. Salary is at the rate of £150 a year, together with board, residence, and laundry.

The appointment will be for a period of six months in the first instance, and for a further period of six months at the option of the Council, but will not be renewable after that time.

Candidates must be duly qualified and registered. Preference will be given to candidates who have held resident hospital appointments, and who are competent anæsthetists.

Applications, with copies of two recent testimonials, should be sent not later than 14th July to Dr. J. J. BUTTERWORTH, School Medical and Child Welfare Department, County Offices, Preston. Duties to commence 1st August, 1930.

GEORGE ETHERTON, Clerk of the County Council.
County Offices, Preston, 21st June, 1930.

County Borough of Bournemouth.

Applications are invited from Medical Men and Women willing to attend at the MALVERN-ROAD and WINTON INFANT WELFARE CENTRES. Each Centre has one session weekly, and the remuneration will be 1½ guineas for a session of approximately 2 hours.

Applications, endorsed "Welfare Centres," should be delivered to the undersigned not later than 10th July, 1930.

HERBERT ASHLING, Town Clerk.
Town Hall, Bournemouth, 25th June, 1930.

Royal United Hospital, Bath.

Wanted, a HOUSE PHYSICIAN, salary £120 per annum. The appointment will be for not less than six months, and candidates must be Male, unmarried, and of British nationality.

Applications, with three testimonials, must be sent immediately, addressed to the undersigned.

GERALD A. KENYON,
Asst. Secretary.

Derbyshire Royal Infirmary, Derby.

(General Hospital, 346 Beds.)

Applications are invited for the post of OPHTHALMIC HOUSE SURGEON.

Candidates must be qualified and registered under the Medical Acts.

The appointment is tenable for twelve months. Salary will be £150 per annum, with apartments, board, &c.

There are 40 beds for Ophthalmic cases and a large Out-patient Department.

Applications, with copies of testimonials, to be sent to the undersigned. WALTER BANKS.
23rd June, 1930. Superintendent and Secretary.

Warwickshire County Council.

ASSISTANT COUNTY MEDICAL OFFICER OF HEALTH.

Applications are invited from qualified and registered Medical Practitioners for the post of Assistant County Medical Officer of Health. The duties will include medical inspection of school-children.

The salary is at the rate of £500 per annum, rising by annual increments of £25 to a maximum of £700 per annum, and is subject to a deduction of five per cent. in respect of contributions under the Local Government and Other Officers' Superannuation Act, 1922. In addition, motor car allowances in accordance with the Council's scale and reasonable travelling expenses are paid. The appointment is subject also to the production of a medical certificate satisfactory to the County Medical Officer of Health. Preference will be given to one who holds a Diploma in Public Health.

Forms of application and statement of the duties and terms of the appointment can be obtained from the undersigned.

Applications (marked "Assistant County Medical Officer of Health"), with copies of not more than three recent testimonials, must be received by me not later than Monday, the 14th July, 1930.

Canvassing, directly or indirectly, will be considered a disqualification. L. EDGAR STEPHENS, Clerk of the County Council.
42, Warwick-street, Leamington, 20th June, 1930.

City of Birmingham.

SELLY OAK HOSPITAL.

SURGEON.

Applications are invited from fully qualified registered Medical Practitioners for the above whole-time appointment.

The present Hospital accommodation is 550 beds, divided into General Medical, General Surgical, Gynæcological, Obstetrical and Children's Disease sections. There are completely equipped Pathological and Biochemical laboratories, X-ray, Electro-therapeutic, Massage, Ultra-violet Ray and Electro-cardiographic departments. Over 3000 operations are performed annually.

Candidates for the appointment must have had good Surgical experience, and be Fellows of the Royal College of Surgeons (England).

The scale of salary will be £700, rising by annual increments of £50 to a maximum of £1000 per annum.

Furnished quarters, rations, laundry, and attendance will be provided. Alternatively, a cash allowance will be paid if the officer appointed is non-resident. The officer appointed will be required to account to the Council for all fees, allowances, and emoluments (other than the foregoing) received by him.

The appointment will be subject to the Birmingham Corporation's Superannuation Scheme, and to the candidate passing a medical examination, and will be subject to three months' notice on either side.

Further particulars of the appointment may be obtained from the Medical Superintendent, R. P. STANLEY KELMAN, Esq., M.B., F.R.C.S. (Eng. and Edin.), at the Selly Oak Hospital. Applications, stating age, experience, and qualifications, accompanied by copies of recent testimonials, and endorsed "Surgeon," should be addressed to me and delivered at my office not later than 10 A.M. on Wednesday, 16th July, 1930.

F. H. C. WILTSHIRE, Town Clerk.
The Council House, Birmingham, June, 1930.

The Mount Vernon Hospital,
Northwood, Middlesex.

The Council of Management will shortly proceed to the election of a GYNÆCOLOGIST. Candidates must be registered Fellows of the Royal College of Surgeons.

Applications, with copies of three testimonials, should be addressed to the undersigned.

WILLIAM J. MORTON, Secretary.

Offices: 7, Fitzroy-square, W.1.

The Sheffield Royal Hospital.

HOUSE SURGEON to the Ear, Nose and Throat Department, also RESIDENT ANÆSTHETIST, required (Male). Salary for the first six months at the rate of £80 per annum, after which £100 per annum, with board, residence, and laundry. There are twelve resident medical officers. Applications should be forwarded at once to

W. H. BOOTH, Superintendent and Secretary.

St. Mary's Hospitals, Manchester.

Two HOUSE SURGEONS for the WHITWORTH ST. WEST HOSPITAL (Maternity), and Two for the WHITWORTH PARK HOSPITAL (one Children's Department and one Gynæcological Department), each for a period of six months from the 1st August next.

Salaries at the rate of £50 per annum, with board and residence. Application, with copies of three testimonials, to be sent to the undersigned on or before the 16th July.

R. RATCLIFFE, Secretary.

Walsall General Hospital, Walsall.

The Committee invite applications from men for the post of CASUALTY HOUSE SURGEON. Salary £120 per annum.

Candidates, who must be registered under the Medical Acts, must produce three recent testimonials.

The appointment will be for six months.

The Hospital contains 100 beds, and is equipped in all Special Departments.

Applications, stating age, qualifications, and nationality, must be received by the undersigned not later than first post, Tuesday, 15th July. WALTER FRANCOMBE, Secretary.

Royal Infirmary, Doncaster.
(185 Beds.)

OPENING NEW BUILDINGS.

Three HOUSE SURGEONS and One HOUSE PHYSICIAN required at once. New building ready for occupation. The House Physician will also be House Surgeon to Ophthalmic and Ear, Nose, and Throat Departments.

The salary of each post is £150 per annum, with board, residence, and laundry.

Appointments are for six months and are renewable.

Applications, stating age and full particulars, together with copies of testimonials, should be sent at once to the Secretary-Superintendent.

Northampton General Hospital.

There is a vacancy immediately for an ASSISTANT HOUSE SURGEON (Male), British nationality. Salary £150 per annum, with board, residence, and laundry.

The successful candidate will be appointed for the period ending 30th September, 1930, and will be eligible for re-election for a further period of six months.

Candidates must be duly qualified and registered.

Applications, stating age, qualifications, &c., with copies of testimonials, to reach the undersigned not later than first post on the 9th July, 1930.

H. St. JOHN WOOD, Secretary-Superintendent.

30th June, 1930.

Ipswich Borough Mental Hospital.

APPOINTMENT OF MEDICAL SUPERINTENDENT.

The Visiting Committee invite applications for the post of Medical Superintendent of the Ipswich Borough Mental Hospital. The salary will be £700 per annum, rising by £25 per annum to £750 per annum, with unfurnished residence, fire and light, garden produce, milk, and laundry, these emoluments being valued for the purpose of the Asylum Officers' Superannuation Act, 1909, at £200 per annum.

An Assistant Medical Officer resides on the premises.

Candidates must be duly qualified Medical Practitioners with Mental Hospital experience, and not over forty years of age. Preference will be given to candidates who have obtained a Diploma in Psychological Medicine, and who have served the office of House Surgeon or House Physician in a General Hospital. Canvassing, directly or indirectly, will be a disqualification.

Applications, endorsed "Medical Superintendent, Mental Hospital," stating age, qualifications, and experience, and accompanied by copies of three testimonials, to be sent to the undersigned not later than the 21st July, 1930. The successful candidate will be required to commence his duties on the 3rd September next.

A. MOFFAT, Clerk to the Visiting Committee.

Town Hall, Ipswich, 25th June, 1930.

Swindon and North Wilts Victoria
HOSPITAL.

Wanted, a RESIDENT MEDICAL OFFICER (Male). Salary £125 per annum, with board, residence, and laundry. Candidates must be registered under the Medical Act. Appointment for the minimum of six months. Applications, stating age, &c., and accompanied by copies of not more than three recent testimonials, should be sent to the undersigned.

A. OAKLEY, Secretary.

Aberystwyth Infirmary and Cardiganshire General Hospital.

HOUSE SURGEON required (Male). Salary £200 per annum, with board, residence, and laundry. Candidates must be fully qualified and registered.

Experience in Anæsthetic and X ray work essential.

Applications, stating age and qualifications, together with three recent testimonials, to be sent by July 29th to the Secretary, The Infirmary, Aberystwyth. Duties to commence Sept. 1st, 1930.

Royal Burgh of Inverness.

PUBLIC HEALTH DEPARTMENT.

Applications are invited for the post of ASSISTANT MEDICAL OFFICER OF HEALTH. Applicants, in addition to performing general Public Health duties, shall have charge of Hospital services. Applicants must be registered Medical Practitioners and hold the Diploma of D.P.H., or other equivalent qualifications. Particulars as to salary and terms of appointment may be obtained on application to the subscriber. Applications, enclosing copies of three recent testimonials, must be lodged with the subscriber on or before 21st July next.

GEO. SMITH LAING, Town Clerk.

Town House, Inverness, 28th June, 1930.

Beckett Hospital and Dispensary,
Barnsley.

The Committee invite applications for the post of HOUSE PHYSICIAN.

Applicants must be registered and hold a Medical and Surgical qualification, and preference will be given to applicants who have held a previous Hospital post and having pathological experience.

Salary £200 per annum, with board, residence, and laundry.

Applications, together with testimonials, should be sent to the undersigned immediately.

ARTHUR L. BOURNE, Secretary-Superintendent.

June 25th, 1930.

Prifysgol Cymru, University of Wales.

The following SCHOLARSHIPS will be awarded by the University of Wales in the session 1930-1931 provided suitable candidates are forthcoming.

The MRS. JOHN NIXON RESEARCH SCHOLARSHIP of the value of £150 for Research in the Department of Medicine and Medical Pathology.

The LORD MERTHYR RESEARCH SCHOLARSHIP of the value of £200 for Research in the Department of Surgery.

The EWEN MACLEAN RESEARCH SCHOLARSHIP of the value of £150 for Research in the Department of Obstetrics and Gynæcology.

The CECIL PROSSER RESEARCH SCHOLARSHIP of the value of £250 for Research in the Department of Tuberculosis.

Candidates should send their applications to the Registrar, University Registry, Cathays Park, Cardiff, not later than September 1st, 1930. Particulars of the conditions of the award of the Scholarships may be obtained from the Registrar at the foregoing address.

Administrative County of Essex.

MALE ASSISTANT
COUNTY MEDICAL OFFICER OF HEALTH.

The County Council of the Administrative County of Essex invite applications for the above post from registered Medical Practitioners specially qualified in the treatment of Tuberculosis, School Medical Inspection, and Maternity and Child Welfare, holding a Diploma of Public Health, and not over forty-five years of age.

Preference will be given to candidates who have had at least three years' experience in Public Health work subsequent to their medical qualification. The salary attached to the appointment will commence at £500 to £600 per annum, according to experience, and will rise, subject to satisfactory service, to £700 per annum. An allowance for travelling will be made. The person appointed will be required to devote his whole time to the service of the Council, and to perform such duties and to furnish such advice and assistance appertaining to his office as may be required, and to reside in such district of the County as the Council may decide. The appointment will be subject to three months' notice on either side.

Applications on the prescribed form, obtainable from the undersigned, and accompanied by copies of not more than three testimonials, which will not be returned, should be addressed to me and delivered at the Shire Hall, Chelmsford, not later than 10 A.M. on Monday, the 14th July, 1930.

JOHN H. GOOLD, Clerk of the County Council.

Shire Hall, Chelmsford, 24th June, 1930.

WEST AFRICAN MEDICAL STAFF

VACANCIES at present exist for MEDICAL OFFICERS in the WEST AFRICAN MEDICAL STAFF.

QUALIFICATIONS.—Candidates must be British subjects of European parentage and under 35 years of age. They must possess a double qualification and be on the British Medical Register. Preference will be given to candidates who have held hospital or public health appointments, or who have special knowledge of anæsthetics, radiology, surgery, medicine, ophthalmology, gynæcology, and midwifery, diseases of the ear, nose and throat, venereal diseases, &c.

SALARY.—£660 per annum, rising by annual increments of £30 per annum to £720 per annum, and then, on confirmation, £720 per annum, rising by annual increments of £40 to £960 per annum, together with a seniority allowance (payable only in West Africa) at the rate of £72 per annum. After three years' service on £960, the salary may be raised to the scale of £1000 per annum, rising by annual increments of £50 to £1150 per annum, together with a seniority allowance at the rate of £100 per annum.

QUARTERS.—Free quarters are provided or an allowance is given in lieu.

OUTFIT ALLOWANCE.—An outfit allowance of £60 is granted on first appointment.

PASSAGES.—Free first-class passages are provided for the officer only both on first appointment and when proceeding on or returning from leave. A married officer will, in certain circumstances, be granted half the cost of his wife's passages to and from West Africa.

TERMS OF APPOINTMENT.—The appointments are pensionable, subject to a probationary period of three years in the first instance.

TOUR OF SERVICE.—The normal tour of service in West Africa is approximately 18 months, though vacation leave may be granted by the Governor after 12 months, and is followed by leave at the rate of one week for each completed month of residential service, plus the time necessarily spent in the voyages to and from England.

COURSE OF INSTRUCTION IN TROPICAL MEDICINE.—Selected candidates will normally be required to attend a course of instruction in Tropical Medicine and Hygiene before proceeding overseas.

DUTIES.—Though Medical Officers are appointed in the first instance for general service, there are good opportunities for work in special branches of medicine and surgery and for research.

Further particulars and forms of application may be obtained on application in writing from the Private Secretary (Appointments), Colonial Office, 2, Richmond Terrace, Whitehall, London, S.W.1.

Royal Cornwall Infirmary, Truro.
(84 Beds.)

HOUSE SURGEON (Male) required with experience of Anæsthetics. Salary £170 per annum, rooms, board, and washing. Apply, with copies of three recent testimonials, to the Secretary, of whom further particulars may be obtained.

The post of Assistant Professor of

ANATOMY in the UNIVERSITY OF MANITOBA will be vacant from October 1st, 1930. Salary 3500 dollars (200 in lieu of passage). Applications, with two or three testimonials, should reach me before August 9th, 1930.

S. W. PROWSE, M.D.
Dean, Faculty of Medicine, Medical College, Winnipeg, Canada.

EGYPTIAN GOVERNMENT.

Egyptian University.

FACULTY OF MEDICINE.

Applications are invited for the newly created chair of PROFESSOR OF HYGIENE. Applicants must have a University Medical qualification, and at least ten years' experience of Public Health work, preferably in a Tropical Country. Candidates must have a recognised qualification in Public Health, and preferably a qualification in Tropical Medicine and Hygiene. They must have held a post in a recognised institute.

The duties of the professor include giving a course of instruction to Undergraduates and a Post-graduate course for the Diploma of Public Health and Tropical Medicine. He will also conduct research work. The language of instruction is English.

The salary offered is £E.1500 (approximately £1538) a year, and the appointment will be on contract for three years, renewable. The contract may be terminated by either side by three months' notice in writing.

One month's salary will be paid in lieu of travelling expenses if the successful applicant is resident in Europe.

If an official of the Egyptian Government is selected for the post he will not receive the advertised salary unless it is sanctioned by the Financial Authorities.

Applications, with copies of Published Research and copies of testimonials, should be addressed to the Dean of the Faculty of Medicine, Egyptian University, Cairo, so as to be received by him not later than September 20th, 1930.

Further details may be secured by application to the Dean.

The Royal Portsmouth Hospital,
Portsmouth.
(Five Resident Medical Officers.)

CASUALTY OFFICER (Male, qualified) required to commence on or about 15th July. Salary at the rate of £100 per annum, with board, &c. Six months' appointment. Eligible on completion of term for appointment to other resident posts.

Application, stating age, nationality, &c., and copies of three recent testimonials, to be sent to the undersigned as soon as possible, from whom all particulars can be obtained.

B. WAGSTAFF, Secretary.

Royal Halifax Infirmary.

Wanted, a THIRD HOUSE SURGEON (Male, unmarried). Candidates must be duly qualified and registered. The appointment will be for a period ending 31st October, 1930. Probable promotion if satisfactory. Salaries of Resident Staff are as follows:—Resident Surgical Officer £250, First House Surgeon £175, Second House Surgeon £150, Third House Surgeon £125 per annum, with residence, board, and laundry.

The Hospital contains 230 beds, has a large Eye, Ear, Nose and Throat Department, Maternity Ward, and Pathological Laboratory. Particulars of the duties may be obtained from the undersigned, to whom applications, with copies of testimonials should be sent.

A. MIDGLEY, Secretary.

21st June, 1930.

North Staffordshire Royal Infirmary,
Stoke-on-Trent. (350 Beds.)
(A recognised Training School for Nurses.)

MATRON.

Applications are invited for the post of Matron. Candidates must be certificated Nurses have had experience of training of Nurses, housekeeping, lundry, supervision, and administration, of a voluntary Hospiatal.

Salary, £250 per annum, increasing to £300 by annual increments of £25.

On receipt of a request, the House Governor will give all necessary particulars.

Applications for the appointment to reach the undersigned not later than Friday, July 11th, 1930.

W. STEVENSON, Secretary and House Governor.

INDIAN MEDICAL SERVICE

RECRUITMENT OF EUROPEAN OFFICERS

Applications are invited from Medical Men for permanent commissions in H.M.'s Indian Medical Service. The Terms offered include a gratuity of £1,000 on retirement after six years' service or £2,500 after 12 years' service, together with free return passages for those who no longer desire to remain in the Service. In other respects the terms will be as detailed below.

Candidates must be British subjects under 32 years of age at the time of application and must be registered under the Medical Acts in force in Great Britain and Northern Ireland.

CAREERS.

The Indian Medical Service offers wide opportunities of medical experience, including clinical, preventive, specialist, and research work. At the beginning of his career an officer is employed on the military side which has medical charge of the Indian Army. Promotion is on a time scale up to the rank of Lieutenant-Colonel, and by selection to the ranks of Colonel and Major-General. An officer may apply after two years' Indian Service to have his name registered for transfer to the civil side, from which appointments are made to Civil Surgeoncies, which are established at the principal civil centres to provide for the medical needs of Civil Officials and for general medical administrative purposes; to specialist (e.g., Public Health and Bacteriological) services; to research posts; and to professorships at the Medical Schools.

PAY.

The monthly rates of pay for European officers in the Service who have a "non-Asiatic" domicile are as follows :—

Rank. 1	Service in Rank. 2	Basic Pay. 3	Overseas Pay. 4	Year of Total Service. 5
		Rs.		
Lieut...	—	500	Rs.150	1st
			150	2nd
			150	3rd
Capt...	(i) During first 3 years' service as Captain ..	650	150	4th
			£15	5th
			15	6th
	(ii) With more than 3 and less than 6 years' service as Captain	750	25	7th
			25	8th
			25	9th
	(iii) With more than 6 years' service as Captain	850	25	10th
			25	11th
			30	12th
Major ..	(i) During first 3 years' service as Major ..	950		
	(ii) With more than 3 and less than 6 years' service as Major	1100		
	(iii) With more than 6 years' service as Major ..	1250		
Lt.-Col.	(i) Until completion of 23 years' total service ..	1500	30	13th and over.
	(ii) During 24th and 25th years' service	1600		
	(iii) After completion of 25 years' total service ..	1700		
	(iv) When selected for increased pay	1850		

Extras.—In addition to the above rates various allowances are admissible for a large number of special appointments on both the military and the civil side which may be held by members of the Indian Medical Service. Special high rates of pay are also attached to the numerous administrative appointments open to officers in both branches of the Service.

ANTEDATES IN COMMISSION.

Any service rendered by an officer during the War as a medical or combatant officer or in a position usually filled by an officer may be counted as service for increments of pay, promotion, retirement and retired pay, but not for gratuity.

One half of any service in the ranks during the War may be counted as service for retirement and retired pay only.

Candidates possessing certain higher medical qualifications may be granted an antedate of one year in their commissions. Past service in certain hospital appointments may also render candidates eligible for an antedate of one year. Persons holding or about to hold resident posts at recognised hospitals may be seconded in those posts for a period not exceeding one year. The maximum period of antedate, secondment, or antedate and secondment combined, admissible under this paragraph, is limited to one year.

OUTFIT ALLOWANCE.

Officers on appointment will receive an outfit allowance of £50.

PRIVATE PRACTICE.

With the exception of Administrative Officers, military or civil, and officers holding certain special appointments, officers are not debarred from taking private practice, so long as it does not interfere with their proper duties.

PENSIONS.

The rates of pension are as follows : —

	Per annum.
After 17 years' service for pension	£400
„ 18 „ „	430
„ 19 „ „	460
„ 20 „ „	500
„ 21 „ „	540
„ 22 „ „	580
„ 23 „ „	620
„ 24 „ „	660
„ 25 „ „	700
„ 26 „ „	750
„ 27 „ „	800

These rates are subject to alteration on account of a rise or fall in the cost of living as compared with the year 1919, to an extent not exceeding 20 per cent. in all, the revision being undertaken triennally. With effect from July 1st, 1927, a reduction of 4½ per cent. has been made on this account from the amounts shown.

There are additional pensions ranging from £65 to £350 per annum for officers who have held administrative appointments.

PASSAGES.

An officer on appointment is provided with free passage to India. The wives and families of officers who are married prior to the date of the officers' embarkation on first appointment will also be provided with free passage to India subject to the payment of messing charges.

Officers and their families are also eligible for passage concessions under which they are granted a certain number of return passages home at Government expense during their service.

INSTRUCTION PRIOR TO EMBARKATION.

Officers are required to undergo courses of instruction at the Royal Army Medical College and at Aldershot, lasting approximately six months, prior to their embarkation for India on first appointment.

Full details regarding these appointments and forms of application may be obtained from the UNDER-SECRETARY OF STATE FOR INDIA, MILITARY DEPARTMENT, INDIA OFFICE, LONDON, S.W.1.

The Selection Committee will meet at the India Office in July, and the selected candidates will be required to join a course of instruction commencing early in August, 1930.

Applications should be submitted as soon as possible.

County Mental Hospital, Lancaster.

Wanted immediately, Temporary ASSISTANT MEDICAL OFFICER (Male) for about three months. Salary 7 guineas per week, with board, apartments, laundry, and attendance. Application, with testimonials and full particulars, stating when at liberty, to be sent to the Medical Superintendent.

Hertford County Hospital.

Applications are invited for the post of HOUSE PHYSICIAN (Male). Salary £150 per annum, with board, residence, and laundry. The appointment is for six months in the first instance.

Applications with copies of three recent testimonials, should be sent to the undersigned as early as possible.

PERCY G. BROOKS, Secretary.

Preston and County of Lancaster ROYAL INFIRMARY.

Applications are invited from gentlemen, doubly qualified and registered, unmarried, and of British nationality, for the post of HOUSE SURGEON (under Consulting Surgeon).

Salary £150 per annum, with board, residence, and laundry.

Application stating age, qualifications, and training, together with copies of recent testimonials, to be forwarded immediately to Mr. JOHN GIBSON, Superintendent and Secretary, Royal Infirmary, Preston.

North Ormsby Hospital, Middlesbrough. (140 Beds.)

HOUSE PHYSICIAN required (Male and unmarried). Salary £120 per annum, with board, residence, and laundry. There are three residents, and the successful candidate will be eligible for the post of House Surgeon in due course. Applications, stating age, qualifications, previous experience (if any), with copies of three recent testimonials, should be sent to the undersigned at once.

GEORGE WATTS, Secretary-Superintendent.

Royal Sussex County Hospital, Brighton. (237 Beds.)

CASUALTY HOUSE SURGEON (Male) required about 7th August, 1930. Salary £120 per annum, with board, residence, and laundry. Candidates must hold Medical and Surgical qualifications of the British Empire, and be duly registered under the Medical Acts. They must be unmarried, and when elected under thirty years of age.

Applications, with copies of recent testimonials, should reach the undersigned not later than the 21st July, 1930.

L. L. W. LANCASTER-GAYE, Secretary-Superintendent.

General Hospital, Nottingham. (377 Beds.)

Wanted, a HOUSE SURGEON. Appointment for six months, commencing about August 8th. Salary at the rate of £150 a year, with board, residence, and laundry.

Applications, stating age, qualifications, and experience, together with copies of testimonials, to be sent to the undersigned not later than Monday, July 21st.

PETER M. MACCOLL, House Governor and Secretary.

Royal Berkshire Hospital. (243 Beds.)

Wanted on July 9th, a CASUALTY OFFICER and a RESIDENT ANÆSTHETIST. Candidates must be fully qualified and registered. The appointments are for six months, and the salaries are at the rate of £150 per annum, with board, residence, and laundry.

Applications, with copies of testimonials, should be addressed to the undersigned. HERMAN BURNEY, Secretary.

Reading, 4th July, 1930.

The Royal Gwent Hospital, Newport, Mon.

HONORARY RADIOLOGIST.

Applications are invited for the post of Honorary Radiologist.

Candidates must be Graduates of a University or Fellows of a Royal College of Surgeons, or Fellow or Member of a Royal College of Physicians, and must be in possession of a Diploma in Radiology.

Applications should be in writing, and sent immediately to the undersigned. J. K. MILLWARD,

1st July, 1930. Secretary-Superintendent.

Oldham County Borough. EDUCATION COMMITTEE.

Wanted immediately, ASSISTANT SCHOOLS MEDICAL OFFICER (Man). Salary commencing at £500 per annum, in accordance with scale of British Medical Association. Applicants must have had at least three years' experience since qualifying. The person appointed will not be permitted to undertake any other duties.

List of duties and form of application, which must be returned immediately, may be obtained from the undersigned.

W. KERSHAW, Secretary for Education.

Education Offices, Oldham, 1st July, 1930.

University of Reading.

The Council will shortly appoint to the INDEPENDENT LECTURESHIP IN AGRICULTURAL BACTERIOLOGY. Stipend £400–£500 per annum. Full particulars may be obtained from the Registrar.

Wanted, Experienced Male Assistant,

with or without view, for large Panel and Private PRACTICE in seaside resort in South-West England. Particulars, copy of testimonials, and photo.—Address, No. 880, THE LANCET Office, 7, Adam-street, Adelphi, W.C.2.

Wanted immediately, Assistant (Male),

University graduate, with good Hospital experience. Old-established, middle-class Practice, ten miles from Charing Cross, borders of Surrey and Kent. Partnership Share offered to suitable man after preliminary assistantship.—Address, No. 881, THE LANCET Office, 7, Adam-street, Adelphi, W.C.2.

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After Office hours—'Phone: Epsom 9142.

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WATERGATE HOUSE, 15, YORK BUILDINGS, ADELPHI, W.C.2. Telephones { TEMPLE BAR 1054 / RIVERSIDE 1254. (*Night Calls*).

Telegrams: "REASIDE, TUBERCLE, WESTRAND, LONDON."

General Practitioner, lately retired

from large practice, is open to take duty, with or without Wife (Midwife). Hospitality and small remuneration. Well versed in Panel, &c. Small town preferred but not essential.—Address, No. 878, THE LANCET Office, 7, Adam-street, Adelphi, W.C.2.

Medical Man, abstainer, experienced

and accustomed to sole management, would undertake Locum work, &c. (outdoor or indoor). Reliable, energetic, and highly recommended. Free from 7th inst. for about three weeks, and from 16th August onwards. Would also consider Assistantship with view or partnership.—Address, No. 884, THE LANCET Office, 7, Adam-street, Adelphi, W.C.2.

Pathological and Bacteriological

LABORATORY ASSISTANTS' ASSOCIATION.—Pathologists and Bacteriologists requiring Skilled Certificated LABORATORY ASSISTANTS are invited to communicate with H. GOODING, Hon. Secretary, "Moelfre," 10, Holbeck-grove, Victoria Park, Manchester. No fees.

Experienced Medical Bibliographer

seeks work. Translations, abstracts, research, &c.—Address, No. 871, THE LANCET Office, 7, Adam-street, Adelphi, W.C. 2.

CONSULTING ROOMS.

Doctor's Widow would like post as

Housekeeper-Caretaker. Excellent references.—Address, No. 875, THE LANCET Office, 7, Adam-street, Adelphi, W.C.2.

For Sale, Private Sanatorium,

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